EXHIBIT D

Exponent®

Expert Report of Timothy Myers, Ph.D., CFEI

In the matter of:

Marcellin, et al.

v.

HP, Inc. and Staples, Inc.

Exponent®

Expert Report of
Timothy J. Myers, Ph.D., CFEI

In the matter of:

Marcellin, et al. v. HP, Inc. and Staples, Inc.

Prepared for:

Christopher Betke, Esquire
Senior Attorney
Coughlin Betke LLP
175 Federal Street
Boston, MA 02110

Prepared by:

Timothy J. Myers, Ph.D., CFEI
Exponent, Inc.
1075 Worcester Street
Natick, MA 01760

December 2, 2024

Contents

1 Qualifications and Other Information

1.1 Qualifications

I am a Principal Engineer and Director of Exponent Inc.'s Natick, Massachusetts, office. I have a B.S. in Forest Resources – Pulp and Paper Science from the University of Washington and Ph.D. in Chemical Engineering from the University of California. I am a licensed professional engineer in multiple states and a Certified Fire and Explosion Investigator (CFEI). I apply chemical engineering principles to investigate and prevent incidents involving chemical releases, fires, and explosions. I am a member of several National Fire Protection Association (NFPA) technical committees responsible for standards and recommended practices for the prevention and mitigation of fires and explosions. I am also a member of the ASTM E-27 committee on the Hazard Potential of Chemicals. I have published research about the fire and explosion hazards of batteries and have previously investigated fires allegedly caused by batteries.

My full curriculum vitae and a list of my deposition and trial testimony from the last four years is provided in Appendix A and Appendix B, respectively.

1.2 Scope

Exponent, Inc. (Exponent), has been retained by Coughlin Betke LLP as part of the ongoing litigation in the United States District Court, Western District of New York, Marcellin, et al., v. HP, Inc. and Staples, Inc. Specifically, I was asked to evaluate the origin and cause of the fire that occurred at 192 Bells Brook Road, Ceres, New York, the home of Carol Marcellin and Charles Hollowell. Additionally, I have also been asked to review and evaluate the expert report and disclosures of Mr. Karasinski proffered by Plaintiffs. As part of my evaluation, I have reviewed photographs from the fire scene and lab exam, relevant standards and codes, and reviewed materials produced in this litigation.

1.3 Materials Reviewed

Appendix C is a list of documents and information I reviewed to form my opinions. If called upon to testify at trial in this matter, I may rely upon the materials listed in Appendix C as exhibits, as well as additional demonstrative exhibits, photographs, or videos of various inspections, data, and information gathered as part of my analysis, other experts' reports and associated data, and the deposition or trial testimony and exhibits of any party.

1.4 Compensation

Exponent charges $630 per hour for my time in 2024. Other consultants at Exponent who assisted me are billed at different hourly rates. No part of my compensation is contingent upon the outcome of this matter.

1.5 Disclaimer

This report summarizes work performed to-date and presents the findings resulting from that work. The opinions presented herein are made to a reasonable degree of scientific certainty and are wholly or substantially based on the specialized knowledge I have acquired through training, study, and experience.

This report, and the accompanying appendices, contains a summary of my opinions and the bases therefor.

I reserve the right to supplement this report and to expand or modify opinions based on review of additional material as it becomes available through ongoing discovery or through any additional work or review of additional work performed by others.

2 Background

2.1 Incident Overview

At 4:15 a.m., January 24, 2020, 9-1-1 received a call from Carol Marcellin reporting a structure fire at 192 Bells Brook Road, Ceres, New York, the home of Carol Marcellin and Charles Hollowell (incident residence/house).[1] Plaintiff expert alleges that the fire was caused by a failure of a 2011 Hewlett Packard (HP) notebook (incident notebook), including the battery pack.[2] The residence is a single level mobile home built in the 1980s with several additions.[3] exterior photographs of the home after the fire are provided in Figure 1 to Figure 3.

Figure 1. Front exterior of the incident residence.[4]

---

1 Allegany County Fire Service Fire Investigation Form (short), p. 2.

2 Fire Investigation Report of Jason Karasinski, p. 45.

3 Allegany County Fire Service Fire Investigation Form (short), p. 2.

4 Greg Gorbett inspection photos.

Figure 2. Rear exterior of the incident residence.[5]

Figure 3. Spare bedroom (left) and garage (right) exterior sides of the incident residence.[6]

---

[5] Greg Gorbett inspection photos.

[6] Greg Gorbett inspection photos (left) and IMG_7710-001.JPG (right).

The layout of the home is provided in Figure 4, below. One of the three bedrooms served as the office where the incident 2011 HP Pavilion notebook and other items were located.

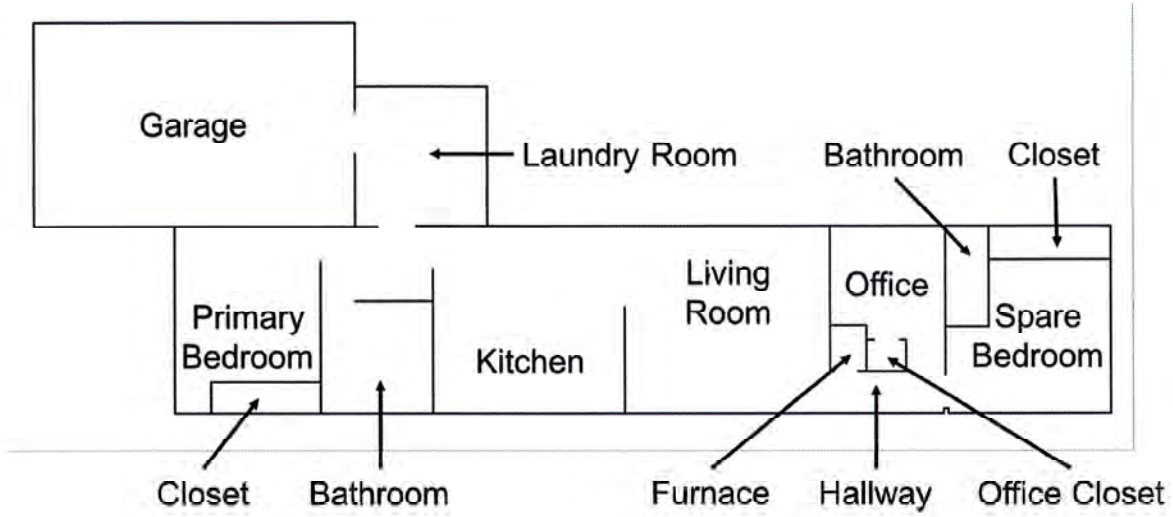


Figure 4. Schematic of the house layout based on the 3D Matterport scan.

Allegany County Fire Service reports the time of the alarm to be 4:15 a.m., when the 9-1-1 call was received by OnStar Telematics. Upon arrival, Bolivar and Portville Volunteer Fire Departments entered the residence to find Mr. Hollowell in the primary bedroom. Fire personnel removed Mr. Hollowell from the bedroom and moved him into the garage, allowing EMS personnel to attempt lifesaving intervention. Mr. Hollowell was later pronounced deceased at Olean General Hospital.[7]

Fire investigators Edwards, Aderhold, Valeri, and Luckey were requested at 4:52 a.m. and assessed the residence, starting with the areas of least damage. Interviews of firefighters revealed the following information:

1. When firefighters entered the home, the fire appeared to be extinguished. They did not observe open flames and there was limited visibility due to smoke.[8]
2. In the kitchen, the toaster oven was on and glowing, so it was unplugged.
3. In the living room, glowing was observed in the ceiling above the couch.[9]
4. The furnace in the hallway was "blown out."[10]

---

7 Allegany County Fire Service Fire Investigation Form (short), p. 2.

8 Signed interview of James D. Beaton, Jr., HP00403.

9 Signed interview of James D. Beaton, Jr., HP00403.

10 Signed interview of Anthony Greenwald, HP00404.

5. Hot spots in the ceiling and wall in the living room and several hot spots in what appears to be the office were extinguished.[11]

The investigators found:

1. Smoke and soot damage in the primary bedroom, where Mr. Hollowell was located.
2. Heat and smoke damage in the kitchen/dining area, with more heat damage located in the area closer to the living room.
3. Heat and smoke damage in the living room, with significant damage in the area of the (electric) couch, which was reportedly not plugged in at the time of the incident.
4. Fire damage at four feet off the floor in the hallway leading to the office, bathroom, and second bedroom.
5. Heat and smoke damage in the second (spare) bedroom.[12]

Upon finishing their analysis of the scene and search for potential ignition sources, Allegany County fire investigators hypothesized that a 2011 HP Pavilion notebook caused the fire. They based their hypothesis on visual inspection of the incident notebook, noting that there was unusual damage in the area between the keyboard and the screen, damage to the paper under the battery cover area on the armoire shelf, and damage to the battery cover and battery itself. They further note that damage to the battery is inconsistent with damage due to fire spread and that the notebook was plugged in. Allegany fire investigators attribute spread of the fire to the explosion of the notebook battery, which sent sparks and flammable material that ignited light-weight fuels in the office area of the computer cabinet or closet.[13] It is not clear what the Allegany fire department did to further test the hypothesis that the HP notebook started the fire. Plaintiff expert alleges that the fire was caused by a failure of the 2011 HP Pavilion notebook, including the battery pack.[14]

2.2 Incident Timeline

The description below is based upon deposition testimony and an interview of Ms. Marcellin and aspects cannot be independently confirmed. At approximately 9:30 p.m. the evening before the incident, January 23, 2020, Ms. Marcellin starts a Norton Antivirus scan on the incident notebook, leaving it plugged in, and goes to sleep.[15,16] She awakens the morning of January 24th to the sound of a smoke detector alarm.[17] Upon sitting up in bed and moving the covers back.

---

[11] Signed interview of Anthony Greenwald, HP00404.

[12] Allegany County Fire Service Fire Investigation Form (short), p. 2.

[13] Allegany County Fire Service Fire Investigation Form (short), p. 3.

[14] Fire Investigation Report of Jason Karasinski, p. 45.

[15] Marcellin Deposition, p. 186.

[16] Marcellin Deposition, pp. 149-150.

[17] Marcellin Deposition, p. 187.

Ms. Marcellin awakens Mr. Hollowell and accidentally sends her cellphone across the room.[18,19] She informs Mr. Hollowell that she thought there was a fire because there was smoke; Mr. Hollowell acknowledges Ms. Marcellin's communication, responding, "Fire?"[20] After telling Mr. Hollowell to get into his wheelchair, Ms. Marcellin leaves the bedroom to investigate the source of the fire, silencing the battery-operated smoke detector in the hallway near the primary bedroom.[21,22] Ms. Marcellin also notes that she hoped that the smoke was just her furnace malfunctioning, that it was putting out smoke and she could shut it down.[23] During her deposition, Ms. Marcellin notes that the lights were off during the incident, at least initially, and that she did not have her contact lenses on.[24,25]

Upon entering the kitchen, Ms. Marcellin notes the time is approximately 4:20 a.m.[26] She passes through the kitchen, into the living room, and sees a glow coming from the office as she begins to step into the hallway. Ms. Marcellin backtracks to the kitchen to grab a fire extinguisher and approaches the office doorway, where she observes "fireballs" emanating from the incident notebook.[27] Realizing the fire was too large to fight, and that she could not grab the handset to the only landline (located inside of the office),[28] Ms. Marcellin retreats to the bedroom to assist Mr. Hollowell – leaving the fire extinguisher on the kitchen countertop.[29] Figure 5 shows a photograph taken by Allegany County fire investigators that documents a cordless phone in a charging station in the spare bedroom. This is not consistent with Ms. Marcellin's testimony that the only landline phone was in the office. Based upon her description of the extent of the fire at the time she went to the office, the cordless phone in the spare bedroom would have been accessible.

---

18 Marcellin Deposition, p. 187.
19 Marcellin Deposition, p. 116.
20 Marcellin Deposition, p. 189.
21 Marcellin Deposition, p. 187.
22 Marcellin Deposition, p. 124.
23 Marcellin Deposition, p. 124.
24 Marcellin Deposition, p. 198.
25 Marcellin Deposition, p. 163.
26 Marcellin Deposition, p. 169.
27 Marcellin Deposition, p. 124.
28 Marcellin Deposition, pp. 115, 204.
29 Marcellin Deposition, p. 125.

Figure 5. Photograph shows a cordless phone in its charging station in the spare bedroom. The light blue box annotated by Exponent highlights the phone's location.[30]

Upon re-entering the bedroom, Ms. Marcellin reportedly finds Mr. Hollowell on the floor; she attempts to lift him into his wheelchair, but he only looks at her with a blank stare, unresponsive.[31] While in the bedroom, Ms. Marcellin attempts to find her cellphone, reportedly the only other phone in the house.[32] Unsuccessful, Ms. Marcellin leaves Mr. Hollowell on the floor of the bedroom with the door cracked open. She exits the house by crawling through the laundry room, using the elevator to enter the garage. Once in the garage, Ms. Marcellin starts her vehicle and backs it into the driveway, where she attempts to use the OnStar Telematics service.[33] Ms. Marcellin drives at least a mile and a half down the road before the service connects and she can report the incident to emergency responders.[34]

---

30 IMG_7745-001.JPG.

31 Marcellin Deposition, pp. 126-127.

32 Marcellin Deposition, p. 167.

33 Marcellin Deposition, pp. 126-127.

34 Marcellin Deposition, p. 128.

While waiting for emergency personnel, Ms. Marcellin drives back to her home and parks at the driveway entrance. Ms. Marcellin does not re-enter the home or have communication with anyone else during this time. Ms. Marcellin does not remember the exact time at which she was able to call emergency personnel, or at what time they arrived at the house. First responders administer oxygen to Ms. Marcellin and transport her to Olean General Hospital, where she is treated for smoke inhalation and provides an incident statement to emergency personnel at 9:00 a.m.[35,36]

Incident notes from emergency personnel reveal additional details about the timeline of events. Responder Mark Collins reports that upon entering the home, another responder, (referred to as "T.S.") calls out something, and Mr. Collins thinks he hears a noise in response.[37] Responders locate Mr. Hollowell in the primary bedroom, where he is reportedly found lying crosswise on the bed, with only his feet touching the ground.[38] Mr. Collins then helps T.S. drag Mr. Hollowell out of the home. They started CPR and found that that Mr. Hollowell has no pulse. Approximately four minutes later, the ambulance arrives on scene and EMS personnel take over resuscitation attempts.[39] Mr. Hollowell is transported to Olean General Hospital and pronounced deceased.[40]

At the end of her deposition, Ms. Marcellin is asked to review the incident report provided by the Allegany County Fire Service, specifically about the position in which Mr. Hollowell was found by first responders – lying crosswise on the bed, rather than on the floor, as Ms. Marcellin had testified too. Ms. Marcellin states that Mr. Hollowell was indeed on the floor the last time she saw him, and that "*if he was on the floor, that he would not have been able to get himself back up.*" [41]

Figure 6 and Figure 7 show photographs of the primary bedroom taken by Allegany County fire investigators. The photographs show a protected region on the bedsheets that is visible because soot accumulated on the bed in areas that were not covered during the fire. The protected area is consistent with the shape of a body lying crosswise on the bed during the fire. This is consistent with the description of where first responders found Mr. Hollowell and is not consistent with Ms. Marcellin's testimony that he was on the floor and would not be able to get onto the bed.

---

35 Marcellin Deposition, pp. 172-173.

36 Allegany County Fire Service Fire Investigation Form (short), p. 3.

37 Mark Collins Notes, HP00402.

38 Allegany County Fire Service Fire Investigation Form (short), p. 2.

39 Mark Collins Notes, HP00402.

40 Allegany County Fire Service Fire Investigation Form (short), p. 2.

41 Marcellin Deposition, pp. 205-206.

Figure 6. Bed and wheelchair (bottom left corner) in primary bedroom. A protected region is visible on the sheets consistent with a body lying crosswise on the bed during the fire.[42]

[42] IMG_7720-001.JPG.

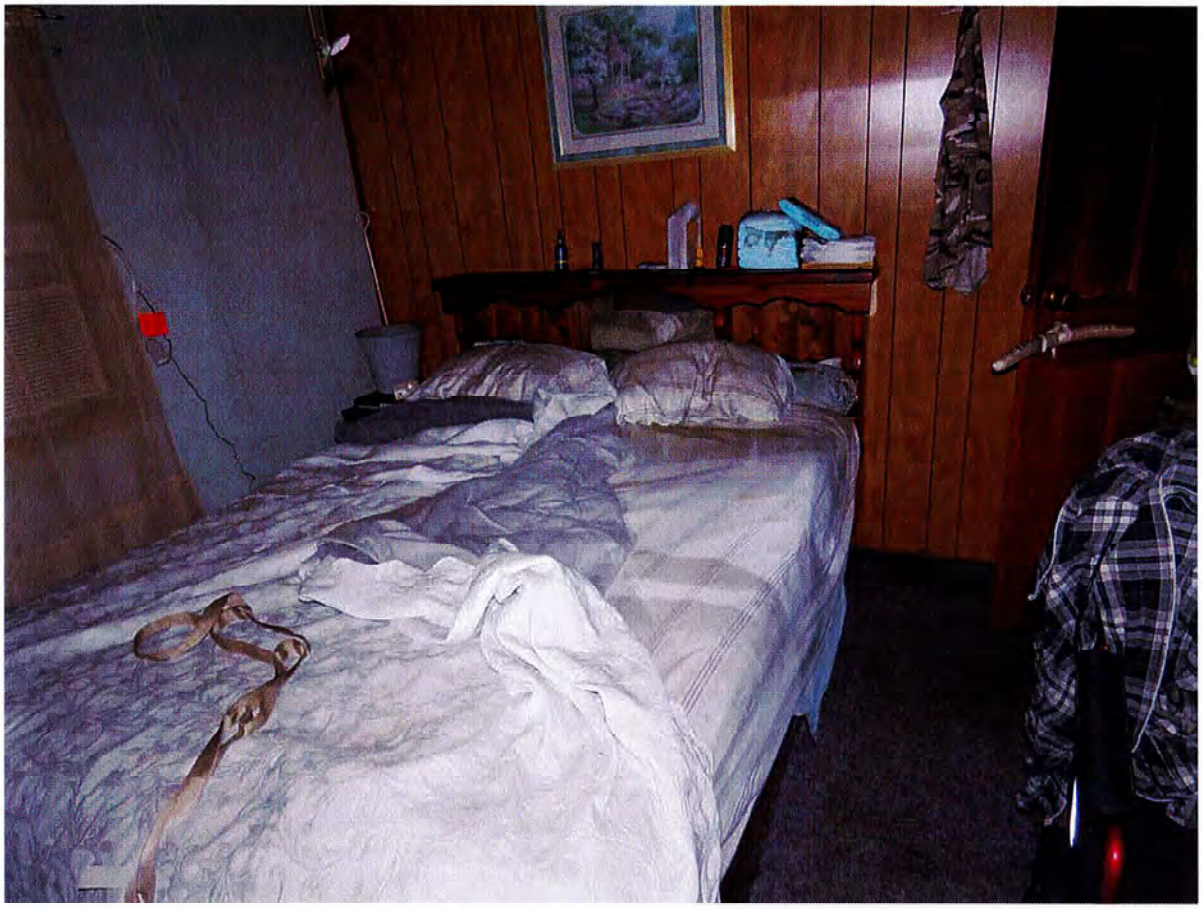


Figure 7. Bed and wheelchair (bottom right corner) in primary bedroom. A protected region is visible on the sheets consistent with a body lying crosswise on the bed during the fire.[43]

[43] IMG_7721-001.JPG.

3 Area of Origin, Ignition Sources, and First Fuel

3.1 Fire Damage Overview

Figure 8 displays a schematic of the living room, office, and hallway connecting the two along with spaces of interest such as the furnace, office closet and couch. The damage observed in the house indicates that the office, the living room, and the hallway connecting the two spaces, experienced the most damage, as depicted by Figure 9 through Figure 17.

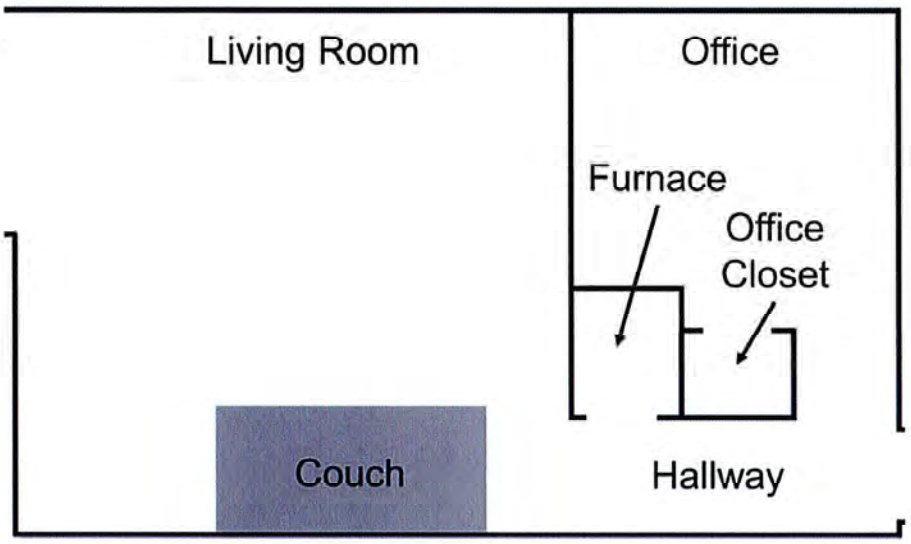


Figure 8. Schematic of the living room, office, and the hallway connection the two spaces.

Figure 9 and Figure 10 display photographs of the kitchen in the incident residence. The kitchen experienced heat damage with soot/smoke deposition observed in the upper half of the room, consistent with smoke accumulation at the ceiling. Radiant heat from hot gasses present in the smoke layer also caused the melting of the ceiling fan blades, as pictured in Figure 9. Upon entering the kitchen, first responder Beaton observed the toaster oven glowing and unplugged it.[44]

[44] Signed interview of James D. Beaton, Jr., HP00403.

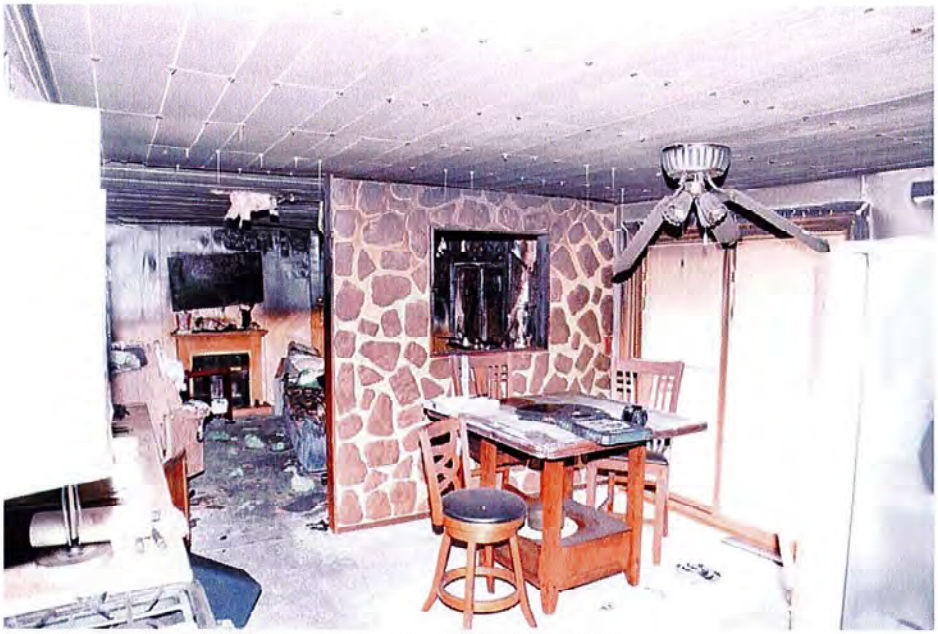


Figure 9. Photograph of the kitchen in the incident house.[45]

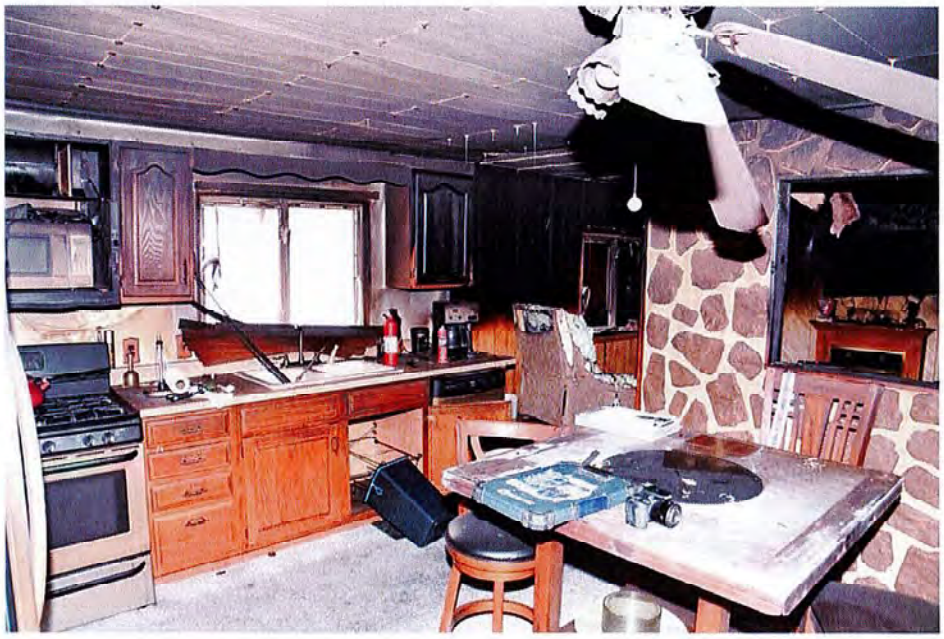


Figure 10. Photograph of the kitchen in the incident house.[46]

[45] Greg Gorbett inspection photos.

[46] Greg Gorbett inspection photos.

Figure 11 and Figure 12 provide photographs of the living room in the incident house. As highlighted in the figures, there is a demarcation line on the living room walls approximately halfway down from the ceiling. Lines of demarcation represent the lower extent of the hot gas layer that forms on vertical surfaces. There is also charring observed on parts of the ceiling and television. The couch in the living room also experienced significant heat damage, with substantial loss of material and charring; it is the lowest burn area in the living room. Damage to the ceiling and wall near the couch is consistent with first responder statements about observing and extinguishing hot spots near the couch.[47]

Figure 11. Photograph of the living room.[48]

[47] Signed interview of James D. Beaton, Jr., HP00403.

[48] Greg Gorbett inspection photos.

Figure 12. Photograph of the couch in the living room.[49] Note that a candle is present on the table to the right of the couch, highlighted by Exponent in blue.

Figure 13 and Figure 14 provide photographs of the ceiling and sides of the hallway, including the furnace space, located at the end of the hallway leading into the living room. Similar to the living room the hallway has a demarcation line extending halfway from the ceiling; charring is also evident on the sidewalls. The furnace also shows heat damage with soot and smoke deposition evident on its exterior. As pictured in Figure 14, the louvered door to the furnace closet is open, and the furnace grill itself is displaced outward at the top, consistent with first responder Greenwald's statement that the furnace was "blown out."[50]

---

[49] IMG_7746-001.JPG.

[50] Signed interview of Anthony Greenwald, HP 00404.

Figure 13. Photograph of the ceiling in the hallway between the living room (behind) and office (on the left).[51]

[51] Greg Gorbett inspection photos.

Figure 14. Photograph of the furnace and hallway between the living room (behind) and office (on the left).[52]

Figure 15 and Figure 16 provide photographs of the office in the incident house. Similar to the living room and hallway, the office also has a demarcation line extending halfway from the ceiling and charring on the side walls close to the office entrance. Section 3.2 provides a more detailed discussion of the damage observed in the office.

[52] Greg Gorbett inspection photos.

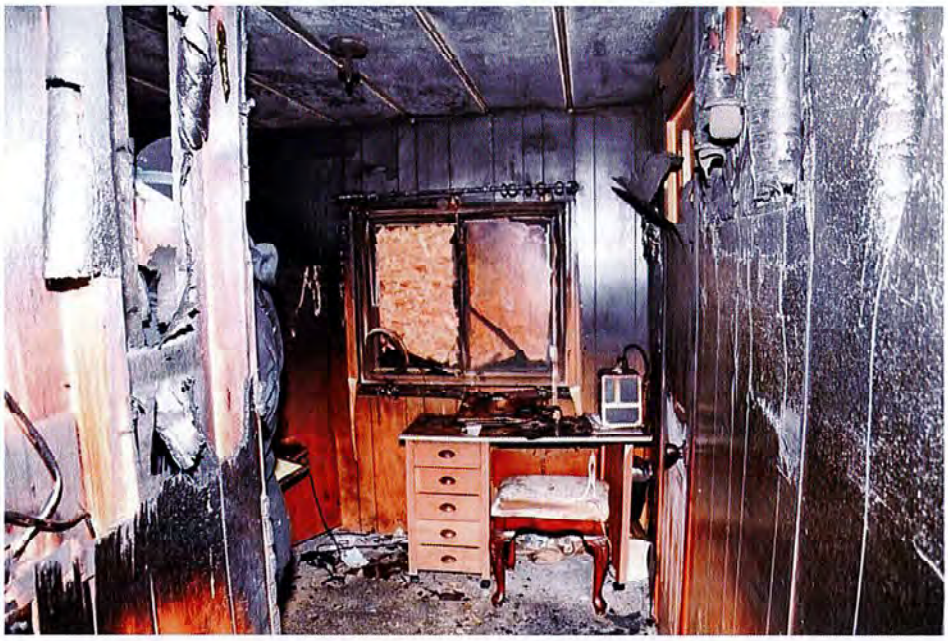


Figure 15. Photograph from the office entrance in the incident house.[53]

Figure 16. Photograph of the office in the incident house.[54]

---

53 Greg Gorbett inspection photos.

54 Greg Gorbett inspection photos.

Figure 17 provides a photograph of the spare bedroom, located at the end of the hallway connected to the living room. This bedroom experienced some heat damage with soot and smoke deposition present in the ceiling and upper area of the room.

Figure 17. Photograph of the spare bedroom.[55]

In summary, photographs of the incident house show that the office space, living room, and hallway connecting the two areas experienced the most damage compared to adjacent areas such as the kitchen and spare bedroom. Therefore, the office space, living room, and hallway are examined in more detail to determine the potential area of origin.

3.2 Area of Origin

The most significant areas of burn damage are near the couch in the living room and in and around the office closet. It is possible that the fire spread from the area of origin via radiant heat from hot gases in the smoke layer. Ms. Marcellin's testimony describes a fire in the office and does not note a fire in the living room, where the couch is located. Her testimony is more

---

[55] IMG_7744-001.JPG

consistent with the fire starting in or near the office. It is worth noting, that some portions of Ms. Marcellin's testimony about the incident are not consistent.

During her deposition, Ms. Marcellin remembers that she could see the glow of a fire coming from the office, the "room where the laptop was."[56] There are several areas of interest in the office that warrant further inspection - the closet, a high-burn area; the armoire, where the incident notebook was located; and the desk, where a second notebook (2019 HP) was located.

Figure 18 provides photographs of the desk in the office space, which can be seen from the office doorway; this is where the second notebook was located. The desk and the carpet underneath exhibit minimal heat damage. Therefore, it is unlikely that the fire initiated in this location.

Figure 18. Photographs of the desk (sewing area) in the office space.[57]

Figure 19 and Figure 20 display photographs of the armoire in the office. The armoire doors have smoke and soot deposition extending almost halfway through its height, consistent with the smoke and soot damage on the walls in the office. The incident notebook on the armoire also shows heat damage to the keyboard and softening and dripping of plastic surrounding the notebook screen. This damage is consistent with radiant heating from a hot layer of gases above. The items present in the armoire display some heat damage consistent with what is expected from hot gas exposure. As highlighted by the boxes in Figure 19 and Figure 20, the light-weight fuel (e.g., sheets of paper) in the armoire has little thermal damage. This suggests that these items were partially shielded from the hot gas layer by the armoire itself. Had the fire originated in or below the armoire, it is likely that these fuels would have been consumed or exhibited greater thermal damage. In contrast, Ms. Marcellin remembers that the armoire and the wall behind it had the most fire.[58] This testimony is not consistent with the physical evidence after the fire.

---

[56] Marcellin Deposition, p. 124.

[57] Greg Gorbett inspection photos.

[58] Marcellin Deposition, p. 212.

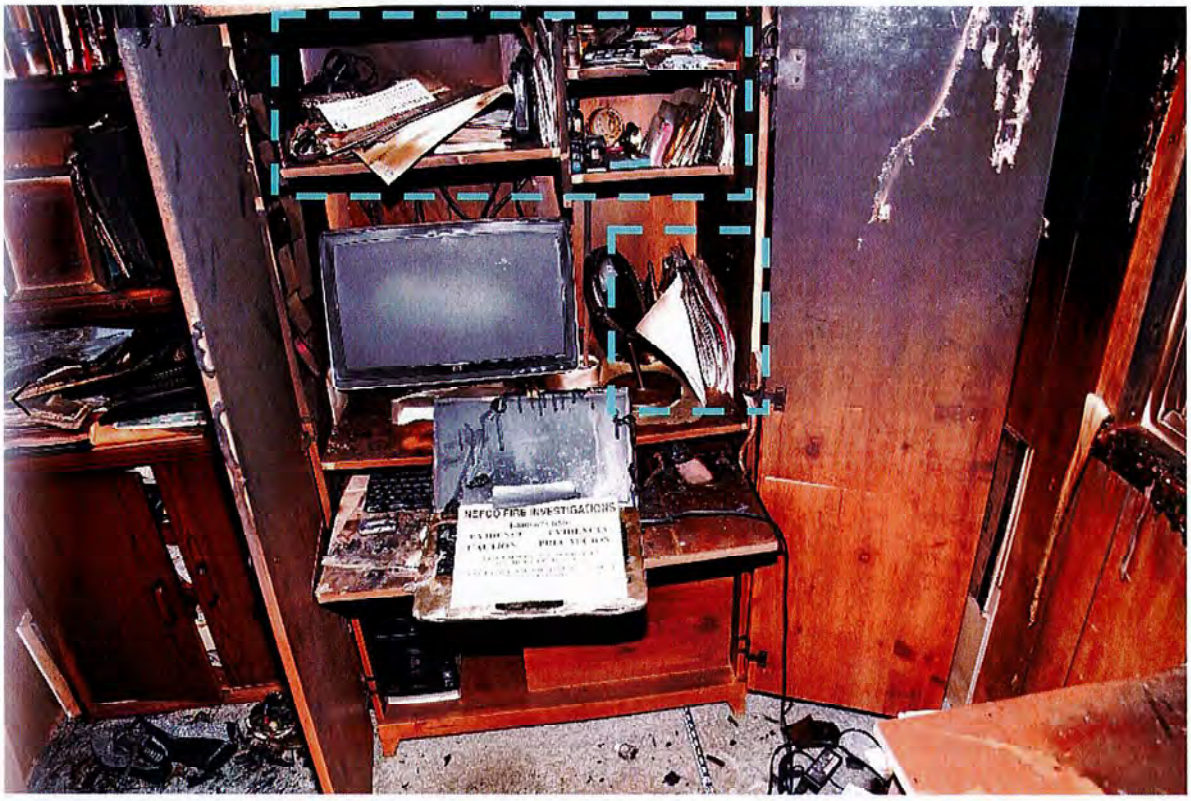


Figure 19. Photograph of the armoire in the office. The blue dashed boxes are annotated by Exponent to highlight unconsumed light-weight fuel present in the armoire.[59]

[59] Greg Gorbett inspection photos.

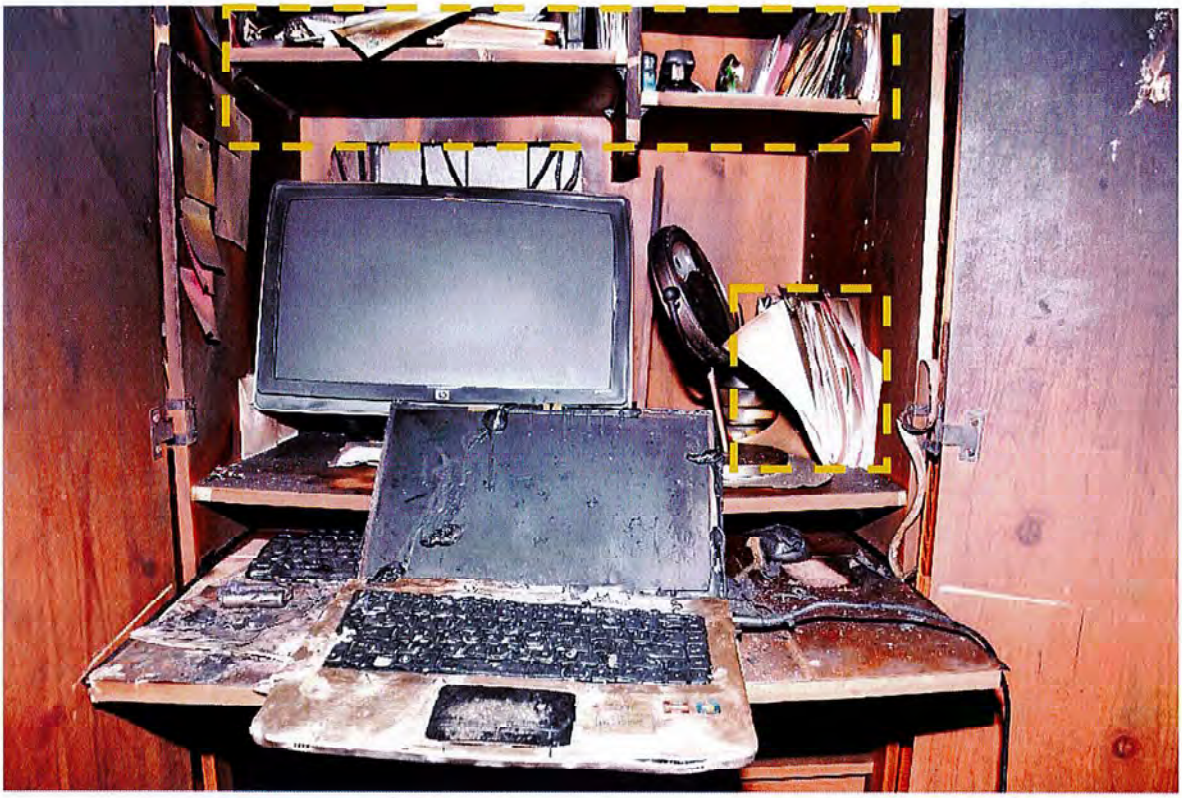


Figure 20. Close-up photograph of the armoire in the office. The yellow dashed boxes are annotated by Exponent to highlight unconsumed lightweight fuel present in the armoire.[60]

Figure 21 reveals the area beneath the armoire pull-out shelf, which shows minimal to no damage. Because this area was shielded by the pull-out shelf, it was protected from the radiant heat given off by the hot gas layer in the upper portion of the room. This is also consistent with the observation that the fire did not initiate in the armoire and that the observed damage was due to heat exposure from hot gases.

[60] Greg Gorbett inspection photos.

Figure 21. Photograph of the underside of the pullout shelf in the armoire, where the incident notebook was located.[61]

Figure 22 provides a photograph of the office closet, which experienced substantial heat damage and mass loss. The lower section of the closet, highlighted by the blue box, shows areas of damage to the closet walls and fuel consumption. Similarly, fuel present in the upper sections of the closet appears to be at least partially consumed. It is probable that the fire started in or near the closet, as this area of the office experienced the most significant thermal damage and loss.

---

61 Greg Gorbett inspection photos.

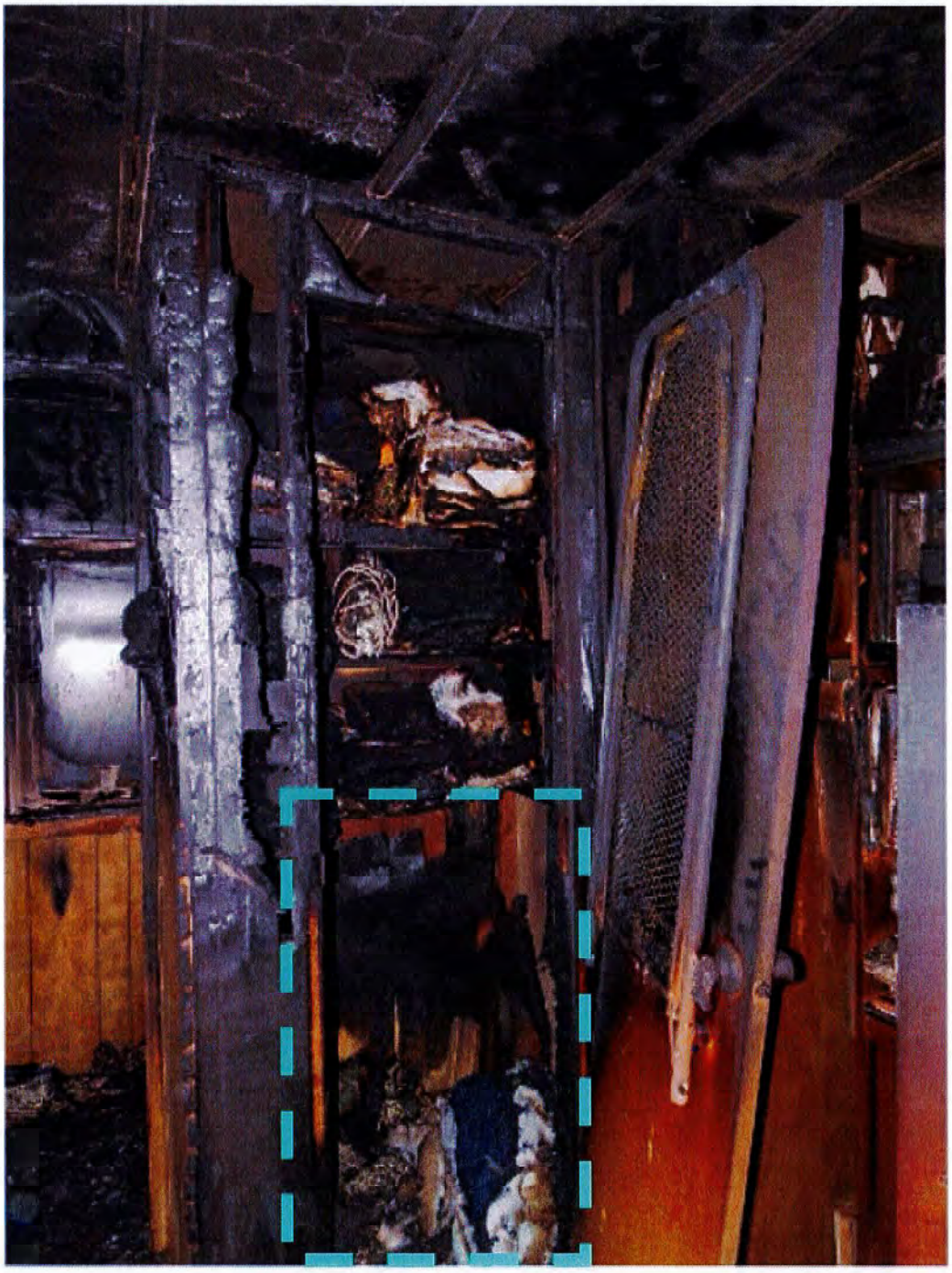


Figure 22. Photograph of the closet present in the office. The box annotated by Exponent to highlight the heat damage present in the lower section of the closet.[62]

62 IMG_7760-001.

Figure 23 displays a photograph of the carpet between the closet and armoire area. The red arrow is oriented from most to least damage, supporting the observation that the fire spread from the closet to other areas in the office.

Figure 23. Photograph of the carpet nearby the closet and armoire highlighting more damage closer to the closet. The red line annotated by Exponent highlights that the heat damage to the carpet is extensive closer to the closet and reduces as you move further away from it.[63]

Figure 24 shows a photograph of the closet door with soot and smoke deposition on it, highlighting the direction of fire movement. This fire pattern is also consistent with the fire spreading from the closet to the rest of the room, as noted by Mr. Karasinski.[64]

---

63 Greg Gorbett inspection photos.

64 "Patterns observed on the ironing board are consistent with fire movement from the closet to the office." Fire Investigation Report of Jason Karasinski, p. 35.

Figure 24. Photograph of the area near the closet. The red line annotated by Exponent shows that the direction of soot and smoke deposition is consistent with fire movement from the closet to the office.[65]

3.3 First Fuel

As highlighted in the previous section, it is probable that the fire originated in the office closet. Therefore, it is likely the case that first fuel for the fire was an item present in the office closet. Figure 25 and Figure 26 show photographs of some of the items in the closet that appear to be burned fuel and might be hard to identify. Some of that fuel might include clothing, as reported in the fire investigation form,[66] and bedding materials as Ms. Marcellin testified were in the office closet.[67] Other material found in the hallway, reported to have originally been stored in the office closet, included an LED lamp, a heated blanket, and an unidentifiable electrical item.[68]

---

[65] Greg Gorbett inspection photos.

[66] Allegany County Fire Service Fire Investigation Form (short), p. 2.

[67] Marcellin Deposition, p. 110.

[68] Litzinger, Andy. FRT 20-047, Fire Research & Technology, LLC., pp. 9-10.

Figure 25. Photograph of some of the items present in the office closet, some of which were consumed by the fire.[69]

[69] Greg Gorbett inspection photos.

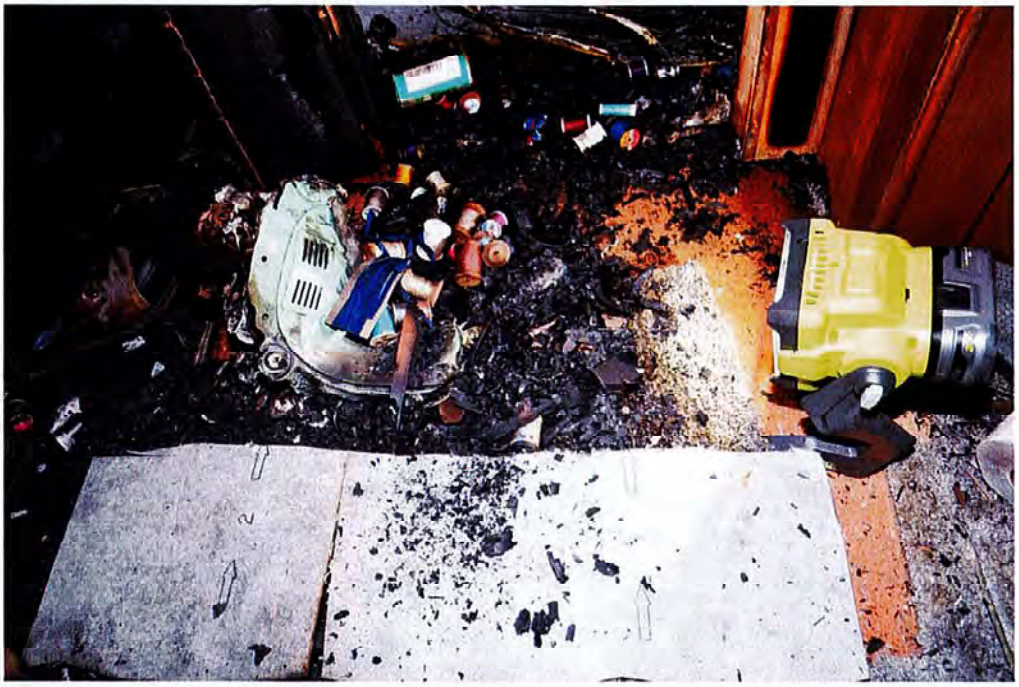


Figure 26. Photograph of the debris from the office closet.[70]

3.4 Potential Sources of Ignition

Potential sources of ignition near the area of origin include electronics within the office, the gas furnace located next to the office, and elements of the living room that were near the office (e.g., the electric fireplace, television, etc.) or those that exhibited significant thermal damage (i.e., the electric couch). Other sources of ignition could include the home's electrical system, a lightning strike, smoking, candles, and incendiary devices, though these sources have been ruled out by initial and subsequent fire investigations by Allegany County and Fire Research & Technology, LLC.[71,72,73] In the following subsections, we focus on the possible sources of ignition named above.

3.4.1 Living Room Electronics

3.4.1.1 Electric Couch

As highlighted in Figure 28 the living room couch experienced significant damage and is the lowest area of burn in the living room. The couch reportedly had electric power, including heating coils. The Allegany County fire investigation team indicated that they verified that the

---

70 Greg Gorbett inspection photos.

71 Allegany County Fire Service Fire Investigation Form.

72 Expert Report of Jason Karasinski.

73 Expert Report of Andy Litzinger.

couch was not plugged in at the time of the incident, and Ms. Marcellin confirmed this when interviewed.[74] In her deposition, Ms. Marcellin mentions that "towards the end," Mr. Hollowell did not use the couch since it was too low for him to get back up off from easily; she also did not experience any problems with the couch, nor had she done any previous repairs.[75] I have not seen photographic documentation that confirms whether the power cord for the couch was connected to a wall outlet or other electrical source at the time of the fire.

Other potential ignition sources could have started a fire in the couch. For instance, Allegany fire investigators documented a candle on the table next to the couch as shown in Figure 27. This indicates that candles and open flames are sometimes used near the couch.

Figure 27. Photograph showing a candle on the table next to the couch. The light blue box annotated by Exponent highlights the candle location.[76]

The fire originating in the couch is not consistent with Ms. Marcellin's recollection of events. It is possible that the couch was ignited by radiant from a hot layer in the room. However, it is

---

[74] Allegany County Fire Service Fire Investigation Form (short), p. 2.

[75] Marcellin Deposition, p. 61.

[76] IMG_7747-001.JPG.

relevant to note that a nearby electric chair shows significantly less thermal damage and mass loss than the couch, as illustrated in Figure 28, below. Of further relevance is the elevated position of the chair, which would have put it in closer proximity to the hot gas layer and the radiant heat coming from it. The greater damage to the couch than the chair would be consistent with the coach being a source of fire, rather than both objects being ignited by being exposed to thermal radiation.

Figure 28. Photograph of electric couch and chair in the living room.[77]

3.4.1.2 Electric Fireplace

As provided in Figure 11, there was an electric fireplace located in the living room, sharing a wall with the office. The thermal damage on the wall in the living room behind the fireplace does not support the fireplace as being the ignition source (i.e., there is no charring present in or around the fireplace).[78]

3.4.1.3 Television

Figure 11 also reveals that the television, located directly above the electric fireplace, was exposed to thermal radiation from the hot gas layer accumulating at the ceiling; protected areas

---

[77] Greg Gorbett inspection photos.

[78] Marcellin Deposition, p. 15.

can be seen around and underneath the television. Given the presence of protected areas surrounding the television, is not a likely cause of the fire.

3.4.2 Natural Gas Furnace

The natural gas furnace used to heat the home shared walls with the office and office closet, as illustrated in Figure 4. The furnace had been replaced less than two years prior to the incident, in the late fall of 2018, by Owl Homes.[79] The reported serial number of the furnace indicates that it is an M7RL Series Single Stage Condensing Downflow Gas Furnace that was manufactured July 24, 2018, and shipped August 31, 2018.[80]

Ms. Marcellin notes that she did not have any gas leaks from the furnace.[81] However, Ms. Marcellin also notes the night of the incident that she hoped it was her furnace putting out smoke, and that she could shut it down.[82] This is consistent with the assumption that the furnace was running the night of the incident, as the outside temperature was 28° F, and Ms. Marcellin reported that they had seldomly used the electric fireplace.[83,84] It is not known if there were prior issues with the furnace generating smoke.

The Allegany County Fire Investigation ruled out the furnace as the source of the fire because the wooden louvers on the furnace door did not exhibit charring on the inside. However, Anthony Greenwald, a member of the second interior firefighting team responsible for advancing the hose line into the living room and cooling hot spots in the interior walls and ceilings, noted that as he moved down the hall to the first room (i.e., the office), he discovered the furnace had been "blown out."[85] There is no further evidence that the furnace was thoroughly inspected or tested. Given the proximity of the furnace to the closet area and the fact that it was operating during the incident time, a potential malfunction of the furnace causing the fire cannot be ruled out.

3.4.3 Office Electronics

3.4.3.1 2019 HP Notebook

Figure 29 shows a photograph of the 2019 HP notebook present on the office desk, also referred to as the sewing area. The notebook was closed during the incident, and its exterior experienced some radiant heat damage from hot gases in the room. However, this notebook remained relatively intact and showed minimal damage on the bottom. There is no evidence that batteries in the notebook went into thermal runaway or that any of its components experienced a failure

---

79 Marcellin Deposition, p. 14.

80 nortekhvacwarranty.com/WarrantyCoverage.aspx?SiteCode=N, Serial Number M7G180752556, Model # M7RL 072A AW, accessed on 12/01/2024.

81 Marcellin Deposition, p. 15.

82 Marcellin Deposition, p. 124.

83 Allegany County Fire Service Fire Investigation Form (short), p. 1.

84 Marcellin Deposition, p. 15.

85 Anthony Greenwald Notes, HP00404.

that would have resulted in it being an ignition source; combined with minimal damage observations, it is unlikely that this notebook was the ignition source of the fire. It is my understanding that the notebook was unplugged.

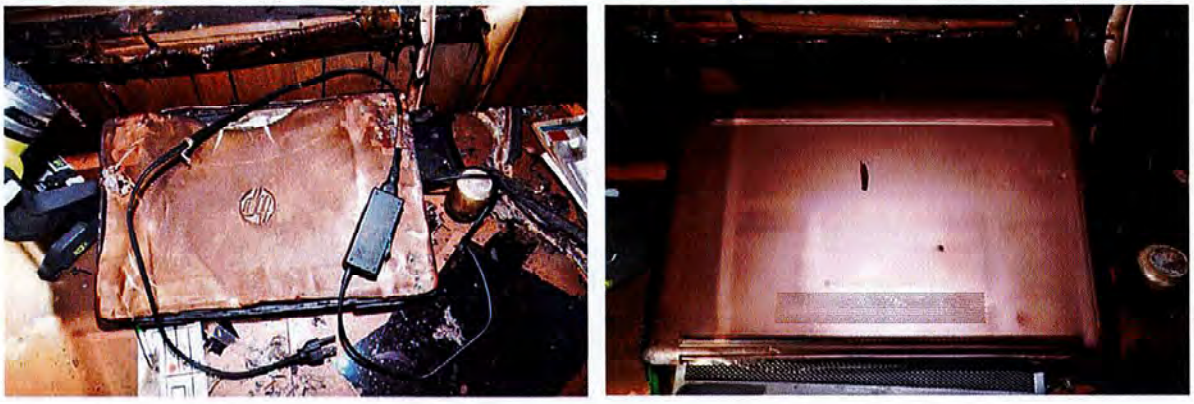


Figure 29. Photograph of the 2019 HP notebook present on the office desk.[86]

3.4.3.2 2011 HP Pavilion Notebook (Incident Notebook)

Figure 30 displays a photograph of the incident notebook, the 2011 HP Pavilion. The notebook's keyboard and the surrounding area show heat damage consistent with radiant heat exposure from the hot gas layer in the office. The yellow box highlights a section of the notebook that is damaged and open around the battery pack area; this could have occurred due to a combination of radiant heat from the hot ceiling layer and thermal runaway of cells. The notebook screen has some resolidified material on it, consistent with softening of plastic around the notebook screen due to radiant heating.

[86] Greg Gorbett inspection photos.

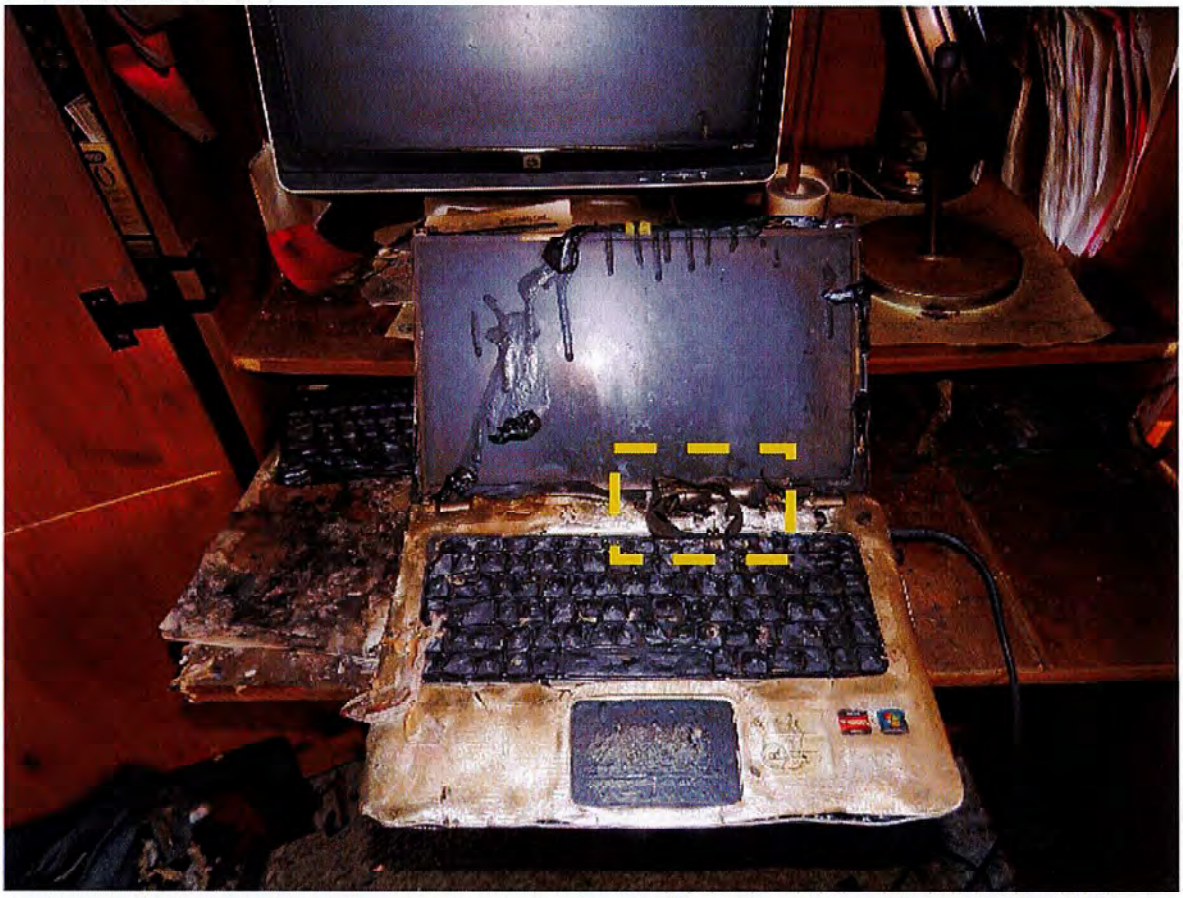


Figure 30. Photograph of the incident notebook. The yellow box annotated by Exponent highlights the ruptured area in the notebook likely where the cells escaped from.[87]

Figure 31 shows a photograph of the bottom part of the notebook. The section of the notebook close to the battery pack appears to have experienced heat damage and softening due to the cells going into thermal runaway. However, it is unlikely that this localized damage initiated the fire, as will be discussed later in this section.

[87] IMG_7768-001.JPG.

Figure 31. Photograph of the bottom of the incident notebook highlighting damage close to where the battery pack is located.[88]

Plaintiff experts allege that a replacement third-party lithium-ion battery pack in the 2011 HP Pavilion notebook went into thermal runaway and caused the fire. As confirmed by Dr. Quinn Horn's Expert Report, four out of the six cells present in the notebook battery pack went into thermal runaway.[89] Lithium-ion batteries can serve as a fuel load in a fire when exposed to heat from an external fire even if they are not the cause of the fire. According to NFPA 921: [90]

> *Similar to other high-energy density fuel packages, when charged lithium-ion batteries are present during a fire they can serve as a fuel load whether they were involved in the cause of the fire or if they were attacked by a fire external to the battery.*

My report will discuss thermal runaway in the context of it being a potential ignition source, however, Dr. Quinn Horn's expert report discusses, in detail, basic battery overview, battery failure modes, and causes of battery thermal runaway.

---

88 Greg Gorbett inspection photos.

89 Dr. Quinn Horn's Expert Report.

90 NFPA 921 Guide to Fire and Explosion Investigation, Section 9.15.1, 2024.

3.4.3.2.1 Review of Timeline of Events

The description of events provided by Ms. Marcellin, in combination with the location of the cells that went into thermal runaway (see Figure 32 and Figure 33, below), indicate that the notebook cells went into thermal runaway because of radiant heat exposure from a pre-existing fire.

In her testimony, Ms. Marcellin explicitly states: [91]

> *When I stepped to the right to go down that hall, I could see the glow of the fire coming from that room where the laptop was. I immediately backtracked to the kitchen, grabbed a fire extinguisher and hoped that when I got to the doorway, I would be able to take care of it, but when I got there, it was already putting out fireballs, whatever they call them, from the battery pack apparently, sending them up to the ceiling. It was catching on fire and dropping from the ceiling, so I couldn't go in.*

Ms. Marcellin's statement that "fireballs" were coming from the notebook's battery pack is consistent with the cells in the battery pack going into thermal runaway - the rapid self-heating of a battery cell derived from the exothermic chemical reactions of a highly oxidizing positive electrode and highly reducing negative electrode. In a thermal runaway reaction, a cell rapidly releases its stored energy and often results in the ejection of hot gases and materials, sparks, and flames. However, battery thermal runaway is a short event that lasts only seconds.[92]

When asked to describe the fire in more detail, Ms. Marcellin observed: *"[...]the ceiling catching on fire. The back wall behind my armoire was literally melting in front of my eyes. Fire was falling down onto the carpet. There was just no way I was going to go in there."* [93] Ms. Marcellin also remembers the smoke layer in the area at *"[...]probably couple of feet hovering over me, you know, between me and the ceiling."* [94]

Ms. Marcellin's description is consistent with a pre-existing fire that was large enough to have already produced a thick smoke layer, set off a smoke detector alarms near the opposite end of the structure, and cause the battery cells of the incident notebook to go into thermal runaway. Given her description of events, it is more likely than not that the thermal runaway event and the resultant hot gases, ejecta, and flames were the result of the notebook being exposed to a preexisting fire, and not being the ignition source of the fire. Otherwise, the thermal runaway event would have concluded before Ms. Marcellin arrived at the office.

---

[91] Carol Marcellin's deposition pp. 124-125.

[92] Dr. Quinn Horn's Expert Report.

[93] Carol Marcellin's deposition p. 202.

[94] Carol Marcellin's deposition p. 165.

3.4.3.2.2 Review of Battery Debris

As previously stated, thermal runaway events can result in the ejection of hot gases and materials. The debris resulting from this thermal runaway event are pictured in Figure 32 below.

Figure 32. Photograph of the office floor with evidence labels for battery debris.[95]

Figure 33 displays a schematic of the battery debris found in the office space. As highlighted in the schematic, two cells were found attached to each other on the office floor in front of the notebook (Cells 1 and 2), two of the battery cells remained in the notebook (Cells 3 and 4), and two battery cells were behind the desk (Cells 5 and 6). The four cells that went into thermal runaway were Cells 3 and 4 that remained in the notebook and Cells 5 and 6 that were found around the desk area. Cells 1 and 2 that were attached to each other and found in front of the notebook on the office floor did not go into thermal runaway.[96]

---

[95] Greg Gorbett inspection photos.

[96] Dr. Quinn Horn's Expert Report.

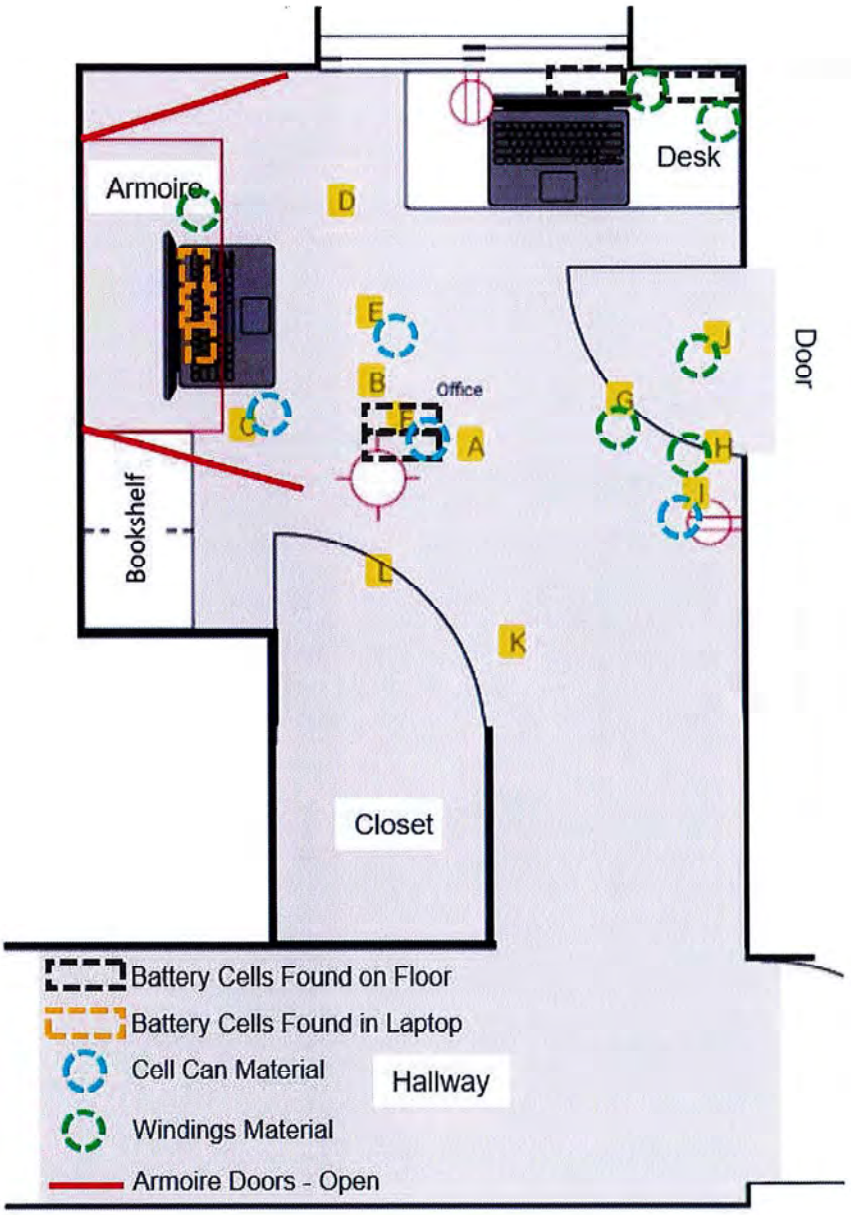


Figure 33. Schematic highlighting the battery debris found on the office floor.[97]

Figure 34 shows a photograph of Cells 1 and 2, which were found on the ground close to the notebook area. As highlighted in Dr. Quinn Horn's Expert Report, these cells did not go into thermal runaway; large portions of the wrapper were still adhered to the cells, the cells were still tapped, and based on the limited X-ray imaging available for review, the cells appeared to have almost entirely intact electrodes internally. Because Cells 1 and 2 did not go into thermal runaway, they can be ruled out as potential ignition sources.

---

[97] Base schematic taken from the Expert report of Mr. Karasinski.

Figure 34. Photograph of the two cells (Cells 1 and 2) found on the office carpet in front of the incident notebook that did not go into thermal runaway.[98]

Cells 3 and 4, which did go into thermal runaway, remained in the incident notebook. This is highlighted in the computed tomography (CT) scan of the notebook shown in Figure 35, below.

[98] Greg Gorbett inspection photos.

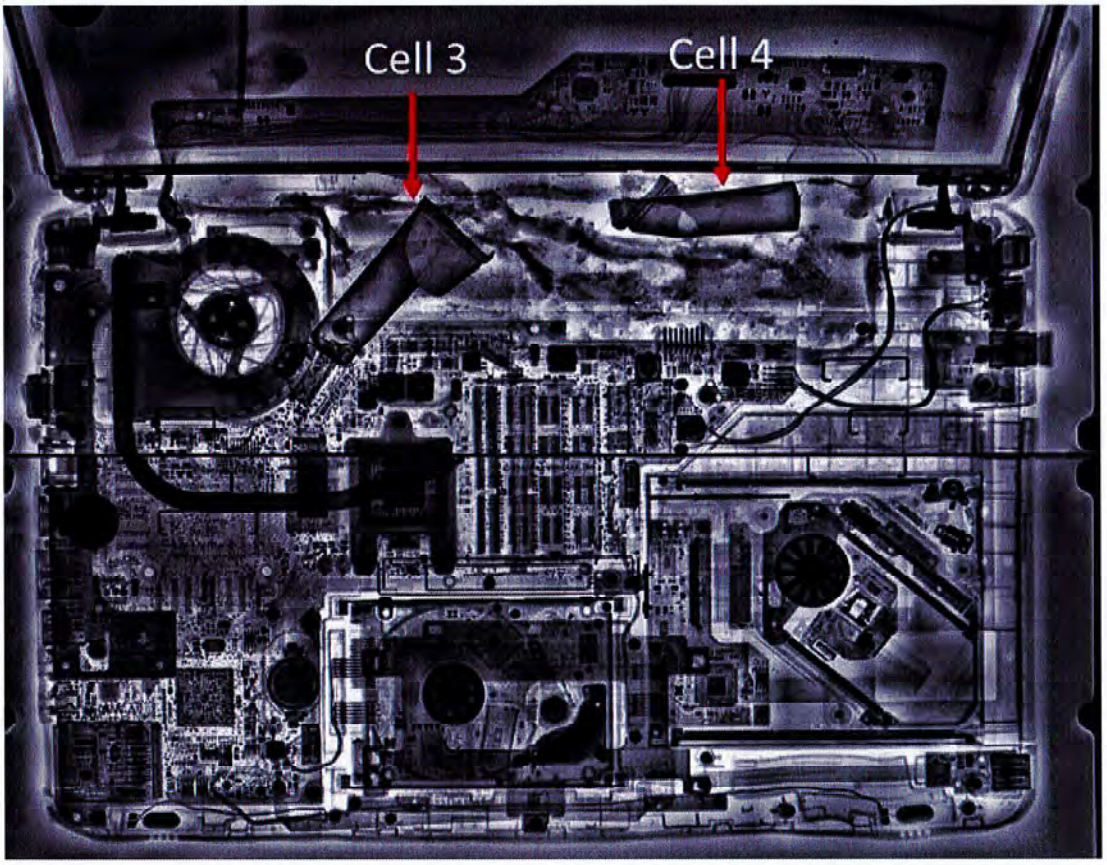


Figure 35. 2D X-ray image of the incident notebook; the cells (Cells 3 and 4) of two of the batteries that went to thermal runaway remained in the notebook.[99]

Although Cells 3 and 4 went into thermal runaway, they did not ignite fuel in close proximity to the notebook. In fact, the paper underneath the notebook, which is highlighted by the yellow box in Figure 36, has limited thermal damage. This is further highlighted in Section 3.2, where Figure 19 - Figure 21 show ample unconsumed fuel in the armoire and minimal damage to the armoire itself.

[99] Received as part of the data from the lab examination.

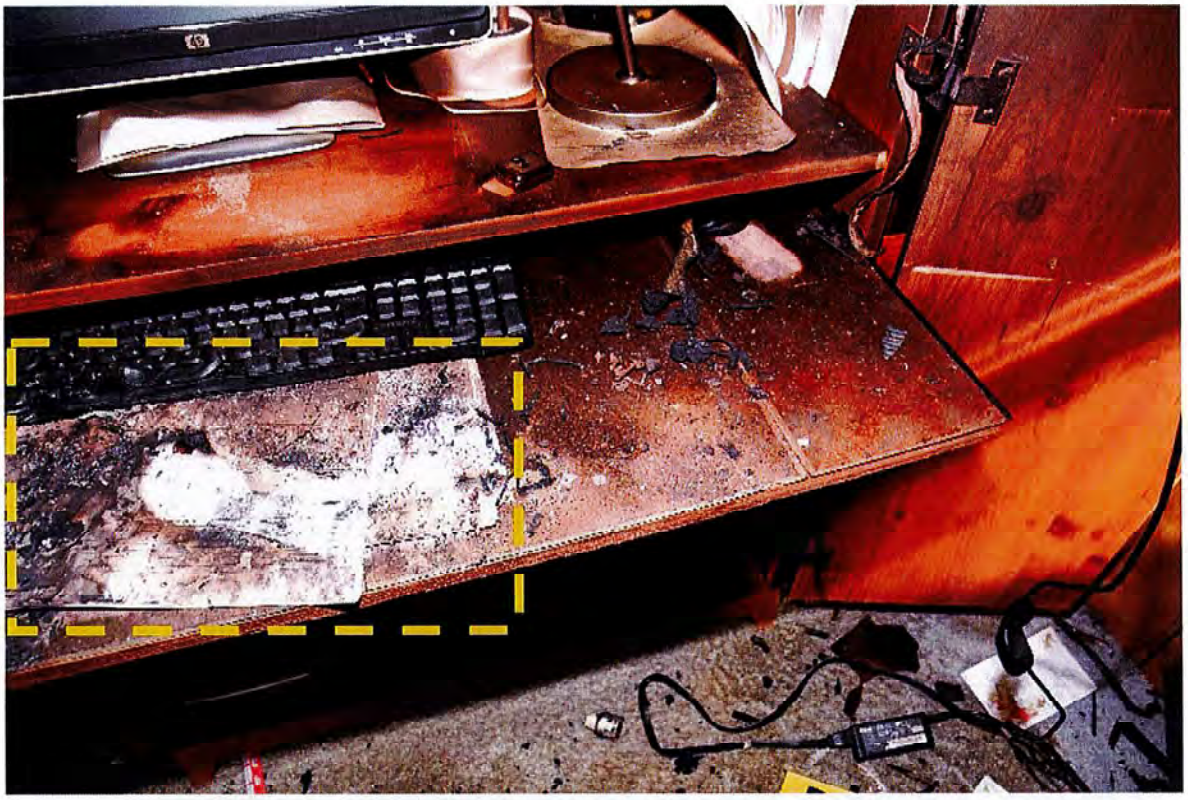


Figure 36. Photograph of the armoire desk where the notebook was found. Annotated by the yellow box added by Exponent is the paper immediately underneath the notebook. The paper was partially protected by the notebook from the radiant heat from the hot gases and was not ignited or burned as a result of the battery thermal runway in the notebook's battery pack.[100]

Figure 37 shows a photograph of the other two cells that went into thermal runaway, Cell 5 and 6. These cells were found near the desk (or sewing area); their locations are highlighted in red. The ejecta from one of the cells can be observed on the carpet close to the cell. The carpet appears relatively undamaged in that area, and as highlighted in Section 3.2, the fire did not originate in the desk area. Therefore, it is also unlikely that these two cells initiated the fire.

[100] Greg Gorbett inspection photos.

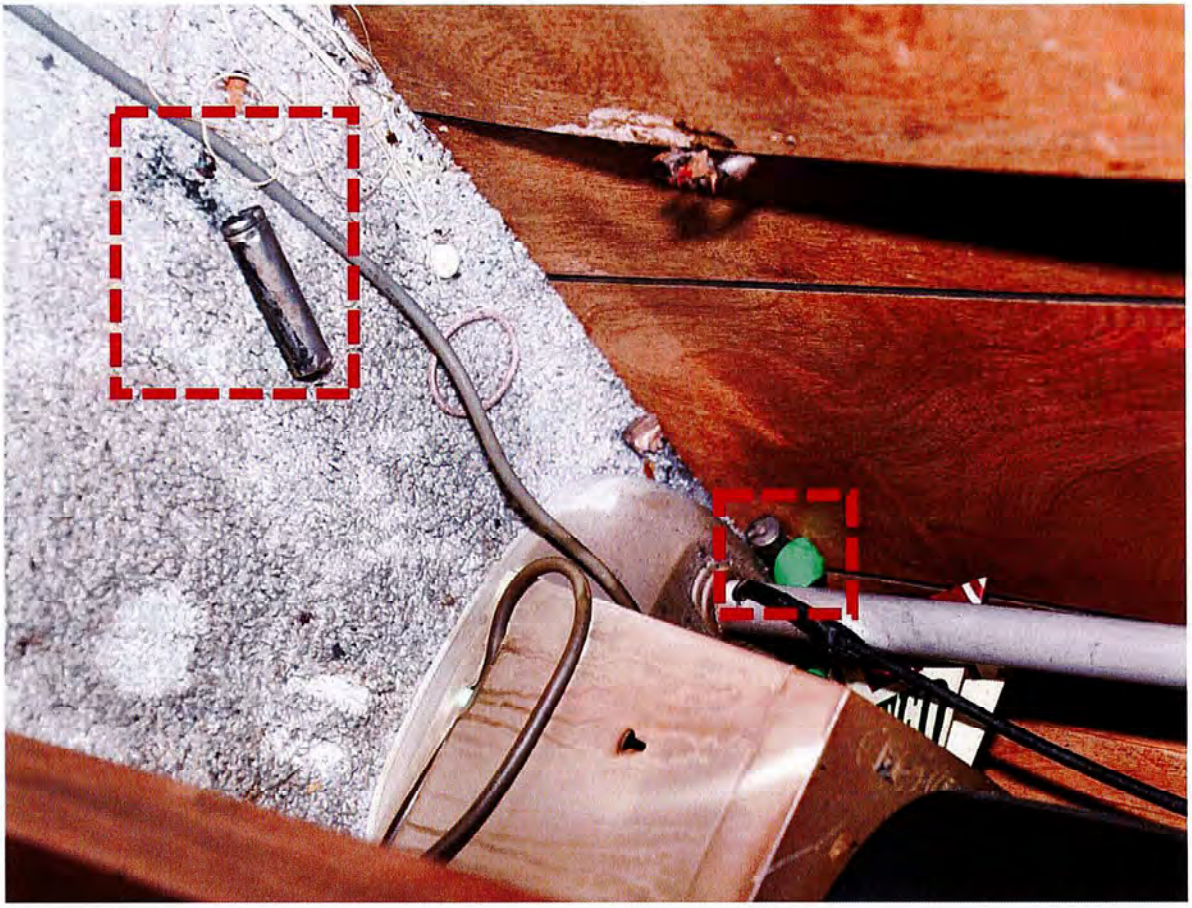


Figure 37. Photograph showing two of the cells located on the carpet close to the desk area. The red boxes annotated by Exponent highlight the cells' locations.[101]

There was no documentation or photographs that indicate the presence of battery debris (i.e., windings, taps, and cells) in the closet. If such debris was present, it likely would have withstood the heat from the fire and could have been collected during the investigation. Therefore, it is unlikely that ejecta from the thermal runaway event ignited fuel in the office closet. To this end, the left armoire door would have at least partially shielded the closet from ejecta consistent with these observations.

3.4.3.3 Other Electronics

Other electronics in the office included a 1990s Compaq notebook, a three-piece desktop unit (located in the armoire with the incident notebook), a printer, and a light-up mirror.

Ms. Marcellin is unable to provide any detail about the three-piece desktop unit pictured in Figure 19, stating that although she had previously owned a three-piece desktop unit (purchased

---

[101] Greg Gorbett inspection photos.

in 2010), she had disposed of it prior to the night of the incident.[102] There is no damage consistent with the desktop unit being the cause of the fire.

Ms. Marcellin also notes that she was not actively using the Compaq notebook but believed it was stored in the closet.[103] Had the Compaq notebook been present in the closet, remains of the notebook would have been present after the fire. Investigators did not report finding remains of the Compaq computer in the closet or in the office. This consumer electronic device and its battery pack are unaccounted for. It is believed that the closet, contained several corded electronic devices, but there was no documentation of electrical receptacles in the closet.

3.4.4 Electrical System

In her deposition, Ms. Marcellin did not report a history of electrical issues with the home.[104] The fire investigation immediately following the incident found Breaker #4, labeled "LR," to be OFF.[105] At the time of the incident, the 2011 HP Pavilion notebook was plugged in to the office outlet corresponding to Breaker #3 which was ON.[106]

3.4.5 Other Sources

Other common sources of ignition such as candles and cigarette butts were reportedly not in use by Ms. Marcellin, who testifies to storing all candles in a drawer in the back bedroom.[107] This statement is contrary to photo evidence, which reveals burnt candles present in the living room, next to the couch.[108] There were also candle sconces on the wall of the office as shown in Figure 38. There were no weather events suggesting a lightning strike at the time of the incident, nor were the indications of fire originating outside of the home.[109]

---

[102] Marcellin Deposition, pp. 104-106.

[103] Marcellin Deposition, p. 133.

[104] Marcellin Deposition, p. 211.

[105] Allegany County Fire Service Fire Investigation Form (short), p. 3.

[106] Litzinger, Andy. FRT 20-047, Fire Research & Technology, LLC. p. 6.

[107] Marcelling Deposition, p. 16.

[108] Greg Gorbott inspection photos (DSC_1540).

[109] Litzinger, Andy. FRT 20-047, Fire Research & Technology, LLC. p. 17.

Figure 38. Photograph on candle sconces on office wall.

3.5 Fire Cause

NFPA 921 Section 3.3.74 defines fire cause as "*the circumstances, conditions, or agencies that bring together a fuel, ignition source, and oxidizer (such as air or oxygen) resulting in a fire or a combustion explosion.*" NFPA 921 Section 19.6.5.2 that "*The identification of an ignition source and a first fuel is not sufficient to determine a cause. Determining a fire cause and ignition sequence requires that any proposed hypothesis include consideration of the relationship between the competency of the ignition source and the first fuel ignited. The investigator should determine if the proposed ignition source is a competent ignition source for the proposed first fuel ignited.*"[110] While it is probable that the area of origin is the office closet, there is no evidence to support that the thermal runaway of the 2011 HP notebook battery cells, or any other potential ignition sources such as the furnace, were a competent ignition source for the first fuel in the closet. As described in NFPA 921, "[i]f the level of certainty is only "possible" or "suspected," the fire cause is undetermined."[111] Therefore, the fire cause is undetermined.

---

[110] NFPA 921 (2024 ed.) Sections 3.3.74 and 19.6.5.2.

[111] NFPA 921, Guide to Fire and Explosion Investigation, Section 19.7.4, 2024 Edition.

4 Opinions

Based on my education, training, experience, expertise, inspection of the evidence, review of documents, and analyses, I have reached the following opinions to a reasonable degree of scientific certainty:

1. Based on Ms. Marcellin's testimony and my review of the incident photographs, it is probable that the fire initiated in or near the closet in the office of the incident house.

    a. Ms. Marcellin testified that she woke up to the sound of the smoke detector alarm going off. She made her way out of the bedroom and silenced the alarm. Then she passed through the kitchen, into the living room, and saw a glow coming from the office as she began to step into the hallway. Ms. Marcellin backtracked into the kitchen to grab a fire extinguisher and approached the office doorway; however, the fire was too intense for her to even attempt to extinguish it.[112]

    b. Post-fire photographs of the house indicate that the office, living room, and the hallway connecting the two, experienced the most heat damage from the fire. Within the office space, I considered different potential areas of origin such as the armoire, desk space, and office closet. The desk area showed minimal heat damage. The armoire experienced some heat damage from the radiant heat of the gases in the room, but it had unconsumed fuel present in it. As a result, the desk and armoire areas can be ruled out as potential areas of origin. The closet showed the most heat damage in the office with both the upper and lower sections of the closet displaying thermal damage and the presence of burned fuel. Patterns on the carpet and closet door also indicate that the fire spread was from the closet to the office. Therefore, it is probable that the fire initiated in the closet. However, an ignition source in the closet was not identified.

2. The description of events provided by Ms. Marcellin, in combination with the location of the cells and debris of the incident 2011 HP Pavilion notebook, indicate that the thermal runaway event was likely a result of radiant heat exposure from a pre-existing fire.

    a. Ms. Marcellin testified that when she reached the office, the fire was well-developed with the ceiling catching on fire, the back wall behind the armoire melting,[113] and smoke hovering a couple of feet above her.[114] Ms. Marcellin also described that the incident notebook was "*already putting out fireballs, whatever they call them, from the battery pack apparently, sending them up to*

---

[112] Marcellin's deposition, pp. 12-125.

[113] Marcellin's Deposition, p. 202.

[114] Marcellin's deposition, p. 165.

the ceiling."[115] Ms. Marcellin's description is consistent with a thermal runway event, but these events are short duration and occur on the order of seconds.[116] It is unlikely that this thermal runaway event was both ignition source of the fire, and able to be observed by Ms. Marcellin who was only awakened after a significant smoke layer had developed and still had to make her way to the other side of the home, where the office was located. Rather, Ms. Marcellin's description is consistent with the notebook experiencing thermal runaway when she reached the office, likely due to radiant heat exposure from the hot gases in the office generated by a pre-existing fire.

b. Four of the six cells in the incident 2011 HP Pavilion notebook went into thermal runaway. Two of those cells remained in the notebook and did not initiate a fire in the armoire area, where there was ample lightweight fuel. The other two cells found on the ground in the desk area did not ignite the surrounding carpet and were far away from the closet, the likely area of origin. Therefore, it is unlikely that the batteries that went into thermal runaway initiated the fire.

c. There is no evidence indicating the presence of battery debris in the closet. If present, this debris likely would have withstood the heat from the fire and could have been collected during the subsequent fire investigation. Therefore, the ejecta from the batteries that went into thermal runway could not have initiated a fire in the closet. To this end, the left armoire door would have at least partially shielded the closet from ejecta, consistent with these observations.

3. The fire cause is undetermined. While possible ignition sources have been identified, there is insufficient evidence to determine the cause of the fire. As described in NFPA 921, "[i]f the level of certainty is only "possible" or "suspected," the fire cause is undetermined."[117]

I reserve the right to amend or augment these opinions as more information becomes available or additional analysis is performed.

---

[115] Marcellin deposition, pp. 124-125.

[116] Dr. Quinn Horn's Expert Report.

[117] NFPA 921, Guide to Fire and Explosion Investigation, Section 19.7.4, 2024 Edition.

Appendix A

Curriculum Vitae of Timothy J. Myers, Ph.D., P.E., CFEI

Exponent®
Engineering & Scientific Consulting

Tim Myers, Ph.D., P.E., CFEI
Office Director and Principal Engineer | Thermal Sciences
Natick
+1-508-652-8572 | tmyers@exponent.com

Professional Profile

Dr. Myers applies chemical engineering principles to analyze industrial processes and to investigate and prevent incidents involving chemical releases, fires, and explosions. His investigations include incidents involving chemical, agricultural and industrial facilities, the warehousing and transport of hazardous chemicals, commercial and residential structures, vehicles, batteries and energy storage systems, consumer products, and burn injuries.

Dr. Myers has investigated incidents involving a wide range of combustion equipment including candles, torches, heaters, ovens, furnaces, and boilers. His work in these investigations has included determining origin and cause, experimentally measuring properties of materials, numerical modeling, and evaluation of products and facilities with current and historical regulations, codes, and guidelines. Dr. Myers has investigated fires and explosions on multiple continents.

Dr. Myers has conducted engineering analysis and experimental testing involving chemical reactions, heat and mass transfer, fluid mechanics, thermodynamics, fires, and dust and gas explosions. He has testified as an expert witness in state and federal courts.

Dr. Myers is a member of several NFPA technical committees responsible for standards related to the prevention and mitigation of fires and explosions He performs dust hazard analyses (DHAs), risk analyses and assists clients in developing mitigation methods.. Dr. Myers evaluates the design and efficacy of fire and explosion protection systems including foams (AFFF), inerting, venting, suppression, isolation, and flame arrestors. He is a member of the ASTM committee responsible for the development of standards to determine the ignition and flammability properties of gases, vapors, and dusts clouds and oversees testing in Exponent's Combustible Dust Testing Laboratory.

Dr. Myers has a particular interest in the stability of chemicals and chemical mixtures and their reactivity hazards. He has investigated incidents involving self-heating or thermal runaway of chemicals and the unintentional reactions of incompatible chemicals. Dr. Myers has developed test methods for assessing self-heating and the hazards of reactive chemicals. He has analyzed the effects of specific chemicals on the integrity of materials including composites, metals, paper, plastics, and wood.

Prior to joining Exponent, Dr. Myers was a Graduate Student Researcher at the University of California, Berkeley and Lawrence Berkeley National Laboratory. He has also worked in process engineering and process control in the pulp and paper industry.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, University of California, Berkeley, 1999

B.S., Forest Resource - Pulp and Paper Science, University of Washington, 1993

Frank Lees Medal, Safety & Loss Prevention Special Interest Group, Institution of Chemical Engineers (IChemE), 2017

Golden Key National Honor Society, University of Washington

Xi Sigma Pi Forestry Honor Society, University of Washington

University of Washington Kyosti V. Sarkanen Scholarship, 1992

Technical Association of the Pulp and Paper Industry (TAPPI) Engineering Division Scholarship, 1992

TAPPI Paper and Board Manufacture Division Scholarship, 1992

Licenses and Certifications

Professional Engineer Chemical, California, #6329

Professional Engineer, Georgia, #PE036505

Professional Engineer Chemical, Maine, #PE12065

Professional Engineer, Ohio, #PE.74253

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Fire and Explosion Investigator (CFEI)

Confined Space Entry (29 CFR 1910.146)

Fire Investigation 1A (Cause and Origin), California Office of State Fire Marshal

Professional Affiliations

American Institute of Chemical Engineers – AIChE (Senior Member, Member of Safety & Health Division)

AIChE Boston Section – Ichthyologists (Member)

American Society for Testing and Materials — ASTM

- Member of Committee E06 on Performance of Buildings
- Vice-Chairman 2012-2018 and Member of Committee E27 on Hazard Potential of Chemicals
- Member Committee F15 on Consumer Products
- Member Committee F27 on Snow and Water Sports

American Society of Heating, Refrigerating and Air-Conditioning Engineers – ASHRAE (Member)

IAAI, Massachusetts Chapter – MAIAAI (Member)

National Association of Fire Investigators – NAFI (Member, CFEI)

National Fire Protection Association

- Principal Member: Committee on Foam responsible for NFPA 11 *Standard for Low-, Medium-, and High-Expansion Foam*

- *Principal Member: Committee on Liquefied Petroleum Gases responsible for NFPA 58 Liquefied Petroleum Gas Code*

- *Chair: Committee on Agricultural Dusts responsible for NFPA 61 Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities*

- *Alternate Member: Committee on Explosion Protection Systems responsible for NFPA 67 Guide on Explosion Protection for Gaseous Mixtures in Pipe Systems, NFPA 68 Standard on Explosion Protection by Deflagration Venting, and NFPA 69 Standard on Explosion Prevention Systems*

- *Principal Member: Committee on Combustible Metals and Metal Dusts responsible for NFPA 484 Standard for Combustible Metals*

- *Principal Member Committee on Electrical Equipment in Chemical Atmospheres responsible for NFPA 496 Standard for Purged and Pressurized Enclosures for Electrical Equipment, NFPA 497 Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas, and NFPA 499 Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*

- *Principal Member: Committee on Fundamentals of Combustible Dusts responsible for NFPA 652 Standard on Combustible Dusts*

- *Principal Member Committee on Wood and Cellulosic Materials Processing responsible for NFPA 664 Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities*

- *Nonvoting Member: Technical Correlating Committee on Combustible Dusts responsible for NFPA 61, 91, 484, 652, 654, 655, 660 and 664.*

Technical Association of the Pulp and Paper Industry – TAPPI (Member)

Publications

Book Chapters

Ibarreta AF, Myers TJ. Explosion prevention and protection. Chapter 17-8 of the 21st Edition of the Fire Protection Handbook, NFPA, 2023.

Myers TJ. Storage and handling of solid fuels. Chapter 7-1 of the 21st Edition of the Fire Protection Handbook, NFPA, 2023.

Publications and Conference Proceedings

Yen M, Ibarreta AF, Hashad K, Myers, TJ. Methods for the analysis of gas explosions. Proceedings, International Symposium on Fire Investigation Science and Technology (ISFI), Orlando, FL, 2024.

Myers, TJ, Watson HAJ, Saba T. Determination of the source of fuel gases involved in explosions. Proceedings, ISFI, Orlando, FL, 2024.

Wechsung A, Orella M, Kersey K, Myers, TJ. The energy transition – how will it impact fire investigation. Proceedings, ISFI, Orlando, FL, 2024.

Wechsung A, Barry M, Dimitrakopoulos G, Spray R, Colella F, Myers, TJ. Lithium-ion battery fire investigation fundamentals. Proceedings, ISFI, Orlando, FL, 2024.

Wechsung A, Yen M, Ibarreta AF, Myers TJ, Kytomaa HK. Venting of hydrogen explosions. Proceedings, AIChE Spring Meeting and 19th Global Congress on Process Safety, Houston, TX, 2023.

Colella F, Mendoza S, Myers TJ, Cook N, Quantifying Lithium-Ion Multi-cell risks, Marine Professional, Issue 1, 2023.

Colella F, Mendoza S, Barry M, Kossolapov A, Spray R, Myers TJ. Energy Release Quantification for Li-Ion Battery Failures, In Compliance Magazine, Feature Article, November 2022

Stern MC, Favero CVB, Ibarreta AF, Colella F, Morrison DR, Myers TJ. Flame arrestor failures in industrial equipment and consumer products. Proceedings, AIChE Spring Meeting and 17th Global Congress on Process Safety, Virtual, 2021.

Ibarreta AF, Myers TJ. Got dust?: Performing a dust hazard analysis (DHA). Proceedings, AIChE Spring Meeting and 17th Global Congress on Process Safety, Virtual, 2021.

Myers TJ, O'Hern SC, Stern MC, Ibarreta AF. Best practices for performing a combustible dust hazard analysis. Leader, VPPPA, 8(1), Winter, 2021.

Myers TJ, Yen M, Mendoza S, Ibarreta AF. Mitigating the hazards of battery systems. Chemical Engineering Progress, May 2020

Ibarreta AF, Colella F, Wolf MI, Yen, M, O'Hern SC, Myers TJ. Modeling of explosion venting fireballs Proceedings, Mary K O'Connor Process Safety Symposium, College Station, TX, 2019.

Ibarreta AF, Colella F, Wolf MI, Vickery J, O'Hern SC, Myers TJ. Measuring leak flow rates in fire and explosion investigations. Proceedings, ISFI, Itasca, IL 2018.

Ibarreta AF, Colella F, Wolf MI, O'Hern SC, Myers TJ. Modeling of explosion venting fireballs. Proceedings, 13th International Symposium on Hazards, Prevention, and Mitigation of Industrial Explosions (ISHPMIE), Kansas City, MO, 2018.

O'Hern SC, Stern MC, Vickery J, Anderson DM, Ibarreta AF, Myers TJ. Impact of dust-fueled flash fires on personal protective equipment fabrics. Proceedings 13th ISHPMIE, Kansas City, MO, 2018.

Stern MC, Bishop J, Ibarreta AF, Ogle RA, Myers TJ. Electrostatic hazards during pneumatic conveying of combustible dusts in flexible hoses. Proceedings, 14th Global Congress on Process Safety, American Institute of Chemical Engineers Spring Meeting, Orlando, FL, 2018.

Ibarreta AF, Myers TJ, O'Hern SC, Stern M. Portable vacuums for AM/PM operations: The good, the bad and the ugly. Proceedings POWDERMET 2017, International Conference on Powder Metallurgy & Particulate Materials, Las Vegas, NV 2017.

O'Hern SC, Stern MC, Anderson DM, Ibarreta AF, Myers T J. Analysis of combustible dust flash fires on personal protective equipment fabrics. Proceedings, Hazards 27, Institution of Chemical Engineers, Birmingham, UK, 2017. Awarded Frank Lees Medal for the most meritorious publication on the topic of safety and loss prevention in an IChemE publication.

Stern MC, O'Hern SC, Ibarreta AF, Ogle RA, Myers TJ. Ignitability of combustible dust fueled flash fires with industrial ignition sources. Proceedings, 13th Global Congress on Process Safety, AIChE Spring Meeting, San Antonio, TX, 2017.

Moberg MA, Mandell ML, Kiel J, Page C, Myers, TJ, Van Sluytman, J. 3D printing/component parts/raw materials. In: 3D Printing of Manufactured Goods: An Updated Analysis, Reed Smith White Paper, Second Edition, 2016.

Stern MC, Rosen J, Ogle RA, Myers TJ. Quantification of the thermal hazard from metallic and organic dust flash fires. Journal of Loss Prevention in the Process Industries 2016, 44:528-537.

Ibarreta AF, Myers TJ. Mitigating fire and explosion hazards of powdered metals. Metal Powder Report 2016; doi:10.1016/j.mprp.2016.01.073.

Myers TJ, Ibarreta AF, O'Hern SC. Mitigating fire and explosion hazards of metal powders: update on changing consensus standards, Proceedings POWDERMET 2016, International Conference on Powder Metallurgy & Particulate Materials, Boston, MA 2016.

Myers TJ, Ibarreta AF, Stern MC, O'Hern SC, Page CD. Combustible dust hazards in additive manufacturing operations, Proceedings POWDERMET 2016, International Conference on Powder Metallurgy & Particulate Materials, Boston, MA 2016.

Stern MC, Budiansky N, Somandepalli V, Reza A, Myers TJ. Accidents during turnarounds, cleanings, and other infrequent operations. Proceedings, 12th Global Congress on Process Safety, AIChE Spring Meeting, Houston, TX, 2016.

Ibarreta AF, Stern MC, Myers TJ. Fire and Explosion Hazards in Enclosed Powder Conveyors. Powder & Bulk Solids 2016, 34(6):26-30.

Myers TJ, Kytömaa, HK, Uncovering patterns to improve process safety. Exponent Oil & Gas Insight, Volume 3, 2015.

Stern MC, Rosen JS, Ibarreta, AF, Myers TJ, Ogle RA. Quantification of the thermal hazard of metallic and organic dust flash fires. Proceedings Mary K O'Connor Process Safety Symposium, College Station, TX, 2015.

Ibarreta AF, Myers TJ. Fire and explosion mitigation strategies for metal powders. Proceedings, Proceedings, POWDERMET 2015, International Conference on Powder Metallurgy & Particulate Materials, San Diego, CA, 2015.

Ibarreta AF, Myers TJ, Marr KC, Garner SW. On the use of laminar burning velocities in process safety. Proceedings, 49th Loss Prevention Symposium, AIChE Engineers Spring Meeting, Austin, TX, 2015.

Stern MC, Rosen JS, Ibarreta AF, Myers TJ, Ogle RA. Unconfined deflagration testing for the assessment of combustible dust flash fire hazards. Proceedings, 49th Loss Prevention Symposium, AIChE Spring Meeting, Austin, TX, 2015.

Stern MC, Ibarreta AF, Myers TJ. Assessment and mitigation of combustible dust hazards in the plastics industry. Proceedings, 30th International Conference of the Polymer Processing Society, Cleveland. OH. 2014 and AIP Conference Proceedings 1664, 180003, 2015.

Myers TJ, Ibarreta AF, Marr KC. Prescriptive versus performance-based mitigation of combustible dust hazards. Proceedings, 48th Loss Prevention Symposium, AIChE Spring Meeting, New Orleans, LA, 2014.

Myers TJ, Ibarreta AF. Tutorial on combustible dust. Process Safety Progress 2013; 32(3):298-306.

Myers TJ, Ibarreta AF, Bucher JM, Marr KC. Assessing the hazard of marginally explosible dusts. Proceedings, 47th Loss Prevention Symposium, AIChE Spring Meeting, San Antonio, TX, 2013.

Ashcraft RW, Ibarreta AW, Myers TJ. Preferential gas flow around a snow-covered pipe: empirical

evidence and modeling. The National Fire Investigator, National Association of Fire Investigators, Fall/Winter 2012.

Bucher JM, Ford WP, Ibarreta AF, Marr KC, Myers TJ. Testing of marginally explosible dusts: evaluation of overdriving and realistic ignition sources in process facilities. Proceedings, Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2012.

Ellison AD, Somandepalli V, Myers TJ. Investigation of carbon monoxide incidents. Proceedings, ISFI, Hyattsville, MD, 2012.

Ibarreta AF, Myers TJ, Bucher JM, Marr K. Explosion severity: propane versus natural gas. Proceedings, ISFI, Hyattsville, MD, 2012.

Ibarreta AF, Myers TJ. Tutorial on combustible dust. Proceedings, AIChE Spring National Meeting, Houston, TX, 2012.

Ashcraft RW, Ibarreta AF, Myers, TJ. Leaking gas from a snow-covered pipe: Empirical evidence and modeling of preferential flow paths. Journal of Fire Protection Engineering 2011; 21:57-79.

Ashcraft RW, Ibarreta AF, Myers, TJ. Preferential gas flow around a snow-covered pipe: Empirical evidence and modeling. Proceedings, ISFI, Hyattsville, MD, 2010.

Kytömaa HK, Myers TJ, Ibarreta AF, Ponchaut N. Using real time process models to detect loss of containment and mitigate hazards. Proceedings, 12th Process Plant Safety Symposium, AIChE Spring National Meeting, San Antonio, TX, 2010.

Myers TJ, Kytömaa HK, Ibarreta AF, Ponchaut N. Analyzing historic process data to identify near misses and warning signs: Examples from the Buncefield incident. Proceedings, 6th Global Congress on Process Safety, AIChE Spring National Meeting, San Antonio, TX, 2010.

Myers TJ, Ibarreta AF. Investigation of the Jahn Foundry and CTA Acoustics dust explosions: Similarities and differences. Journal of Loss Prevention in the Process Industries 2009; 22:740-745.

Myers TJ. Dust explosions. Georgia Defense Lawyer 2009; VI(II):12, 27, 28.

Myers TJ, Ibarreta AF. Case study of a hydrogen explosion in an electrical panel. Fire Safety Magazine 2009 Spring; 12-19.

Myers TJ, Ibarreta AF, Ashcraft RW. Dust explosion prevention: regulations, standards, and mitigation techniques. Proceedings, 43rd Annual Loss Prevention Symposium, AIChE Spring National Meeting, Tampa, FL, 2009.

Myers TJ. Reducing aluminum dust explosion hazards: Case study of dust inerting in an aluminum buffing operation. Journal of Hazard Materials 2008; 159(1):72-80.

Myers TJ, Long RT, Gavelli F, Kytömaa HK. The use of smoke detector sequence of activation in determining the area of origin of a fire: investigation of the FedEx DC-10 fire. Proceedings, ISFI, Cincinnati, OH, 2008.

Myers TJ, White KC, Xu T. Did a dust explosion occur? Microscopic and thermogravimetric techniques to determine if dust participated in an explosion event. Proceedings, ISFI, Cincinnati, OH, 2008 and Proceedings, Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2008.

Myers TJ, Hinze PC, Kytömaa HK. Fire and explosion in an explosives conditioning bunker. Proceedings, 42nd Annual Loss Prevention Symposium, AIChE Spring National Meeting, New Orleans, LA, 2008.

Myers TJ, Ibarreta AF. Case study of a hydrogen explosion in an electrical panel. Proceedings, 42nd Annual Loss Prevention Symposium, AIChE Spring National Meeting, New Orleans, LA, 2008.

Myers TJ, Ibarreta AF. Investigation of the Jahn Foundry and CTA acoustics dust explosions: Similarities and differences. Proceedings, Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2007.

Rangwala AS, Myers TJ, Ibarreta AF. Measurements of the non-dimensional Frank-Kamenetskii number using a standard dust layer ignition testing apparatus. Proceedings, 5th International Seminar on Fire and Explosion Hazards, Edinburgh, UK, 2007.

Myers TJ, Kytömaa HK, Smith TR. Environmental stress-corrosion cracking of fiberglass: Lessons learned from failures in the chemical industry. Journal of Hazardous Materials 2007; 142(3):695-704.

Myers TJ. Reducing aluminum dust explosion hazards: Case study of dust inerting in an aluminum buffing operation. Proceedings, Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2006.

Myers TJ. Concurrent investigations with the CSB — The perspective of a private party investigator. Proceedings, ISFI, Cincinnati, OH, 2006.

Myers TJ, McWhorter T. Making a reactive chemical system inherently safer at a small company: Case study of the CDG Gas:Solid™ chlorine dioxide generator. Proceedings, Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2005.

Myers TJ, Kytömaa HK, Smith TR. Environmental stress-corrosion cracking of fiberglass: Lessons learned from failures at small chemical facilities. Proceedings, Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2005.

Myers TJ. Dust explosions in the pulp and paper industry. Proceedings. Technical Association of the Pulp and Paper Industry Engineering, Pulping, and Environmental Conference, Philadelphia, PA, 2005.

Myers TJ, Kytömaa HK, Martin RJ. Fires and explosions in vapor control systems: A lessons learned anthology. Process Safety Progress 2003; 22(4):195-199.

Martin RJ, Myers TJ, Hinze PC, Kytömaa HK. Test your incinerator knowledge. Chemical Engineering Progress 2003; 99(2):36-39.

Martin RJ, Hinze PC, Myers TJ, Kytömaa HK. Thermal oxidizing systems. Hydrocarbon Processing 2002; 81(11):79-80.

Myers TJ, Kytömaa HK, Martin RJ. Fires and explosions in vapor control systems: A lessons learned anthology. Proceedings, 36th Annual Loss Prevention Symposium, AIChE Spring National Meeting, New Orleans, LA, 2002.

Myers TJ, Radke CJ. Transient foam displacement in the presence of residual oil: Experiment and simulation using a population-balance model. Industrial & Engineering Chemistry Research 2000; 39:2725-2741.

Myers TJ. The role of residual oil in the mechanistic simulation of foam flow in porous media: Experiment and simulation with the population-balance method. Ph.D. Dissertation, University of California, Berkeley, 1999.

Presentations

Yen M, Ibarreta AF, Hashad K, Myers, TJ. Methods for the analysis of gas explosions. ISFI, Orlando, FL,

2024.

Myers, TJ, Watson HAJ, Saba T. Determination of the source of fuel gases involved in explosions. ISFI, Orlando, FL, 2024.

Wechsung A, Orella M, Kersey K, Myers, TJ. The energy transition – how will it impact fire investigation. ISFI, Orlando, FL, 2024.

Wechsung A, Barry M, Dimitrakopoulos G, Spray R, Colella F, Myers, TJ. Lithium-ion battery fire investigation fundamentals. ISFI, Orlando, FL, 2024.

Wechsung A, Sulmonetti T, Myers T, Kytomaa HK. Safely implementing an explosive hydrogen market: applying lessons learned to expanding hydrogen usage. AIChE Spring Meeting & 20th Global Congress on Process Safety, New Orleans, LA, 2024.

Wechsung A, Dimitrakopoulos G, Hashad K, Myers TJ. Are power-to-heat technologies ready to transition to your facility?. AIChE Spring Meeting & 20th Global Congress on Process Safety, New Orleans, LA, 2024.

Wechsung A, Reding N, Ibarreta AF, Myers TJ. Navigating Unfamiliar Territory: US Hydrogen Safety Regulations and European Standards. 2023 Center for Hydrogen Safety Europe Conference, Rotterdam, Netherlands, 2023.

Myers TJ. NFPA 660 and dust hazard analysis. Convery '23, Omaha, NE, 2023.

Wechsung A, Yen M, Ibarreta AF, Myers TJ, Kytomaa HK. Venting of hydrogen explosions. Poster presentation, AIChE Spring Meeting and 19th Global Congress on Process Safety, Houston, TX, 2023

White CC, Streifel BC, Wechsung A, Myers TJ. Understanding the pathways for residual PFAS during fluoropolymer processing. ACS Spring Meeting, San Diego, CA, 2022.

Ibarreta AF, Myers TJ. Analysis of industrial explosions. Oakland County Association of Arson and Fire Investigators Inc.(QCAAFII) Quarterly Training, Virtual, 2021.

Ibarreta AF, Myers TJ. Vapor cloud explosion (VCE) basics. Tutorial presentation at AIChE Spring Meeting and 17th Global Congress on Process Safety, Virtual, 2021.

Stern MC, Favero CVB, Ibarreta AF, Colella F, Morrison DR, Myers TJ. Flame arrestor failures in industrial equipment and consumer products. AIChE Spring Meeting and 17th Global Congress on Process Safety, Virtual, 2021.

Ibarreta AF, Myers TJ. Got Dust?: Performing a Dust Hazard Analysis (DHA). AIChE Spring Meeting and 17th Global Congress on Process Safety, Virtual, 2021.

Barry MT, Vickery J, Spray RL, Myers TJ. Investigating the effects of testing conditions on gas evolution in lithium-ion battery abuse tests. Battery and Energy Storage Conference, AIChE, Virtual, 2020.

Barry MT, Vickery J, Spray R, Myers TJ. Understanding how testing conditions affect hazard quantification in lithium-ion battery abuse tests. ESA Energy Storage Annual Conference & Expo, Virtual, 2020.

Yen M, Ibarreta AF, Mendoza S, Myers TJ. Using process safety principles to mitigate the hazards of battery energy storage systems. AIChE Spring Meeting and 16th Global Congress on Process Safety, Virtual, 2020.

Myers TJ, Watson, H. Process hazard analyses (PHAs) and process safety management (PSM),

Massachusetts Institute of Technology (MIT), 10.490 Integrated Chemical Engineering, Cambridge, MA, 2019.

Ibarreta AF, Colella F, Wolf MI, Yen M, O'Hern SC, Myers TJ. Modeling of explosion venting fireballs. Mary K O'Connor Process Safety Symposium, College Station, TX, 2019.

Favero CVB, Vickery J, O'Hern SC, Stern MC, Ibarreta AF, Myers TJ. Exposure of fabrics used in personal protective equipment to combustible dust flash fires. Mary K O'Connor Process Safety Symposium, College Station, TX, 2019.

Myers TJ. Mitigating fire and explosion hazards of battery energy storage systems. Battery and Energy Storage Workshop, AIChE, New York, NY, 2019.

Myers TJ, O'Hern SC. Best practices for performing a combustible dust hazard analysis (DHA). Safety+ National Symposium, Voluntary Protection Program Participants' Association (VPPPA), New Orleans, LA, 2019.

Myers TJ. Hot topics in fire and explosion investigation: batteries, computed tomography (CT) and 3D models. NJDA 53rd Annual Convention, Brewster, MA 2019.

Ibarreta AF, Colella F, Wolf MI, Vickery J, O'Hern SC, Myers TJ. Measuring leak flow rates in fire and explosion investigations. ISFI, Itasca, IL 2018.

Myers TJ, Ibarreta AF, Colella F, Wolf MI, O'Hern SC. Modeling of explosion venting fireballs. 13th International Symposium on Hazards, Prevention, and Mitigation of Industrial Explosions (ISHPMIE), Kansas City, MO, 2018.

O'Hern SC, Stern MC, Vickery J, Anderson DM, Ibarreta AF, Myers TJ. Impact of dust-fueled flash fires on personal protective equipment fabrics. 13th ISHPMIE, Kansas City, MO, 2018.

Myers TJ, Ibarreta AF. Explosion protection in industrial settings. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, 2018.

Stern MC, Bishop J, Ibarreta AF, Ogle RA, Myers TJ. Electrostatic hazards during pneumatic conveying of combustible dusts in flexible hoses. 14th Global Congress on Process Safety, AIChE Spring Meeting, Orlando, FL, 2018.

O'Hern SC, Stern MC, Vickery J, Anderson DM, Ibarreta AF, Myers TJ. Analysis of combustible dust flash fires on personal protective equipment fabrics. 14th Global Congress on Process Safety, AIChE Spring Meeting, Orlando, FL, 2018.

Mandell M, Myers TJ, Page C. 3D Printing: Component Parts/Raw Materials Product Liability & Health Risks, Webinar, Reed Smith, 2017.

Ibarreta AF, Myers TJ, O'Hern SC, Stern MC. Portable vacuums for AM/PM operations: The good, the bad and the ugly. POWDERMET 2017, International Conference on Powder Metallurgy & Particulate Materials, Las Vegas, NV 2017.

O'Hern SC, Stern MC, Anderson DM, Ibarreta AF, Myers TJ. Analysis of combustible dust flash fires on personal protective equipment fabrics. Proceedings. Hazards 27. Institution of Chemical Engineers. Birmingham, UK, 2017.

Stern MC, O'Hern SC, Ibarreta AF, Ogle RA, Myers TJ. Ignitability of combustible dust fueled flash fires with industrial ignition sources. 13th Global Congress on Process Safety, AIChE Spring Meeting, San Antonio, TX, 2017.

Myers TJ. Dust explosion hazards, ASM Boston and ASM Central Massachusetts Joint Meeting, Framingham, MA, 2017.

Myers TJ. Dust explosions, Webinar, AIChE and Associaçao Brasileira de Engenharia Química (ABEQ), 2016.

Bershad T, Kreitman K, Hart P, Myers TJ, Runyon M, Reason J, Drake M. NFPA combustible dust standards - an update, NFPA Conference and Expo, Las Vegas, NV, 2016.

Myers TJ, Ibarreta AF, O'Hern SC. Mitigating fire and explosion hazards of metal powders: update on changing consensus standards, Proceedings POWDERMET 2016, International Conference on Powder Metallurgy & Particulate Materials, Boston, MA, 2016.

Myers TJ, Ibarreta AF, Stern MC, O'Hern SC, Page CD. Combustible dust hazards in additive manufacturing operations, Proceedings POWDERMET 2016. International Conference on Powder Metallurgy & Particulate Materials, Boston, MA, 2016.

Buehler CS, Myers TJ, Kytömaa HK. Using data analytics to improve process safety, 12th Global Congress on Process Safety, AIChE Spring Meeting, Houston, TX, 2016.

Stern MC, Budiansky N, Somandepalli V, Reza A, Myers TJ. Accidents during turnarounds, cleanings, and other infrequent operations. 12th Global Congress on Process Safety, AIChE Spring Meeting, Houston, TX, 2016.

Stern MC, Myers, TM. Mitigating safety and regulatory risk in a chemical project effort. AIChE, 2015 Annual Meeting, Salt Lake City, UT, 2015.

Stern MC, Rosen JS, Ibarreta, AF, Myers TJ, Ogle RA. Quantification of the thermal hazard of metallic and organic dust flash fires. Mary K O'Connor Process Safety Symposium, College Station, TX, October 27, 2015.

Myers TJ. The Buncefield explosion. Boston Section of the AIChE, Natick, MA 2015.

Myers TJ, Ibarreta AF. Combustible dust programs: Hazard assessment and compliance. Region II Voluntary Protection Program Participants' Association (VPPPA) Annual Conference, Atlantic City, NJ, 2015.

Marr KC, Myers TJ. Fire and explosion hazards of batteries. Energy Storage Association (ESA) 25th Annual Conference and Expo, Dallas, TX, 2015.

Ibarreta AF, Myers TJ. Fire and explosion mitigation strategies for metal powders. POWDERMET 2015, International Conference on Powder Metallurgy & Particulate Materials, San Diego, CA, 2015.

Ibarreta AF, Myers TJ, Marr KC, Garner SW. On the use of laminar burning velocities in process safety. 49th Loss Prevention Symposium, AIChE Spring Meeting, Austin, TX, 2015.

Stern MC, Rosen, JS, Ibarreta AF, Myers TJ, Ogle RA. Unconfined deflagration testing for the assessment of combustible dust flash fire hazards. 49th Loss Prevention Symposium. AIChE Spring Meeting, Austin, TX, 2015.

Ibarreta AF, Myers TJ. Over-reliance on automated controls and alarms: A case study. New England Area Chapters of American Society of Safety Engineers (ASSE), Warwick, RI, December 2014.

Stern MC, Ibarreta AF, Myers TJ. Assessment and mitigation of combustible dust hazards in the plastics industry. 30th International Conference of the Polymer Processing Society, Cleveland, OH, 2014.

Myers TJ, Ibarreta AF, Marr KC. Prescriptive versus performance-based mitigation of combustible dust hazards. 48th Loss Prevention Symposium, AIChE Spring Meeting, New Orleans, LA, 2014.

Myers TJ, Ibarreta AF, Bucher JM, Marr KC. Assessing the hazard of marginally explosible dusts. 47th Loss Prevention Symposium, AIChE Spring Meeting, San Antonio, TX, 2013.

Bucher JM, Ibarreta AF, Marr KC, Myers TJ. Testing of marginally explosible dusts: Evaluation of overdriving and realistic ignition sources in process facilities. Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2012.

Ellison AD, Somandepalli V, Myers TJ. Investigation of carbon monoxide incidents. ISFI, Hyattsville, MD, 2012.

Ibarreta AF, Myers TJ, Bucher JM, Marr K. Explosion severity: propane versus natural gas. ISFI, Hyattsville, MD, 2012.

Myers TJ. Pellet mill safety: Assessing risk and implementing safeguards for accident prevention. Pellet Fuel Institute Annual Conference, Mashantucket, CT, 2012.

Myers TJ, Ibarreta AF. The role of engineering analysis in explosion investigations. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, 2012.

Ibarreta AF, Myers TJ. Tutorial on combustible dusts. AIChE Spring National Meeting, Houston, TX, 2012.

Bucher JM. Ibarreta AF. Myers, TJ. Combustible dusts: hazard recognition and abatement. Greater Boston Chapter American Society of Safety Engineers (ASSE), Hopkinton, MA, 2011.

Myers TJ. How a small company responded to incidents and made a reactive chemical system inherently safer. AIChE Northeast Regional Conference, New York, NY, 2011.

Ibarreta AF, Myers TJ. Fires and explosions involving fuel gas systems. First Party Claims Conference (FPCC), Providence-Warwick, RI, 2010.

Ibarreta AF, Ashcraft RW, Myers, TJ. Preferential gas flow around a snow-covered pipe: Empirical evidence and modeling. ISFI, Hyattsville, MD, 2010.

Myers TJ. OSHA regulation updates on powder coating safety — Explosion prevention and fire suppression systems. National Association of Pipe Coating Applicators Summer Workshop, Houston, TX, 2010.

Myers TJ, Ibarreta AF. Investigation of explosions using engineering analysis. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, 2010.

Kytömaa HK, Myers TJ, Ibarreta AF, Ponchaut NF. Using real time process models to detect loss of containment and mitigate hazards. 12th Process Plant Safety Symposium, AIChE Spring National Meeting, San Antonio, TX, 2010.

Myers TJ, Kytömaa HK, Ibarreta AF, Ponchaut NF. Analyzing historic process data to identify near misses and warning signs: Examples from the Buncefield incident. 6th Global Congress on Process Safety, AIChE Spring National Meeting, San Antonio, TX, 2010.

Myers TJ, Ibarreta AF. Water leaks, oil spills and gas explosions - When good pipes go bad. Cozen O'Connor, Philadelphia, PA, 2010.

Kytömaa HK, Myers TJ, Ibarreta AF, Ponchaut NF. Anatomy of the failures that led to the Buncefield explosion and fire. Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2009.

Myers TJ. Dust explosions. Webinar, AIChE, 2009.

Myers TJ, Ibarreta AF, Ashcraft RW. Dust explosion prevention: regulations, standards, and mitigation techniques. 43rd Annual Loss Prevention Symposium, AIChE Spring National Meeting, Tampa, FL, 2009.

Myers TJ, Ibarreta AF. Using fire protection engineering to investigate explosions. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, 2009.

Myers TJ. Dust explosion mitigation: OSHA regulations and relevant standards. National Association of Pipe Coating Applicators Summer Workshop, Houston, TX, 2008

Myers TJ, Long RT, Gavelli F, Kytömaa HK. The use of smoke detector sequence of activation in determining the area of origin of a fire: investigation of the FedEx DC-10 fire. ISFI, Cincinnati, OH, 2008.

Myers TJ, White KC, Xu T. Did a dust explosion occur? Microscopic and thermogravimetric techniques to determine if dust participated in an explosion event. ISFI, Cincinnati, OH, 2008 and Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2008.

Myers TJ, Hinze, PC, Kytömaa, HK. Fire and explosion in an explosives conditioning bunker. 42nd Annual Loss Prevention Symposium, AIChE Spring National Meeting, New Orleans, LA, 2008.

Myers TJ, Ibarreta AF. Case study of a hydrogen explosion in an electrical panel. 42nd Annual Loss Prevention Symposium, AIChE Spring National Meeting, New Orleans, LA, 2008.

Myers TJ, Ibarreta AF. Explosion investigation: Reverse-engineering a blast scene. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, 2007.

Myers TJ. Dust explosions — Identifying and mitigating the hazard using consensus standards. American Society of Safety Engineers (ASSE) Professional Development Conference, New England Area, Worcester, MA, 2007.

Ramirez J, Myers TJ, Long RT. Identificación de los Peligros de Explosiones de Polvo Usando las Normas de la NFPA. XXII Exposición, SegurShow 07, Caracas, Venezuela, 2007.

Myers TJ, Ibarreta AF. Investigation of the Jahn Foundry and CTA acoustics dust explosions: Similarities and differences. Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2007

Myers TJ, Long RT. Identification of dust explosion hazards and mitigation using NFPA Standards National Fire Protection Association World Safety Congress and Exposition, Boston, MA, 2007.

Myers TJ, Wu N. Material flammability and its contribution to fire growth. The Hartford Financial Services Group, Hartford, CT, 2007.

Rangwala AS, Myers TJ, Ibarreta AF. Measurements of the non-dimensional Frank-Kamenetskii number using a standard dust layer ignition testing apparatus. 5th International Seminar on Fire and Explosion Hazards, Edinburgh, UK, 2007.

Myers TJ. Reducing aluminum dust explosion hazards: Case study of dust inerting in an aluminum buffing operation. Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2006.

Myers TJ. Concurrent investigations with the CSB — The perspective of a private party investigator. ISFI, Cincinnati, OH, 2006.

Myers TJ, McWhorter T. Making a reactive chemical system inherently safer at a small company: Case study of the CDG Gas:Solid™ chlorine dioxide generator. Mary Kay O'Connor Process Safety Center

Symposium, College Station, TX, 2005.

Myers TJ, Kytömaa HK, Smith TR. Environmental stress-corrosion cracking of fiberglass: Lessons learned from failures at small chemical facilities. Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2005.

Myers TJ. Dust explosions in the pulp and paper industry. Technical Association of the Pulp and Paper Industry Engineering, Pulping, and Environmental Conference, Philadelphia, PA, 2005.

Myers TJ. Scientific investigation of fires and explosions. Pennsylvania Defense Institute Annual Meeting, Gettysburg, PA, 2004.

Myers TJ, Kytömaa HK, Martin RJ. Fires and explosions in vapor control systems: A lessons learned anthology. 36th Annual Loss Prevention Symposium, AIChE Spring National Meeting, New Orleans, LA, 2002.

Radke CJ, Myers TJ. Modeling foam flow in porous media in the presence of residual oil. Oil Contractor Review Program Meeting, National Petroleum Technology Office, Denver, CO, 2000.

Myers TJ, Radke CJ. The bridging coefficient as an antifoaming criterion: Thermodynamic basis and film-rupture mechanisms. AIChE Annual Meeting, Dallas, TX, 1999.

Myers TJ, Radke CJ. Transient foam displacement in the presence of residual oil: Experiment and simulation using a population-balance model. Society of Petroleum Engineers Annual Technical Conference and Exhibition, Houston, TX, 1999.

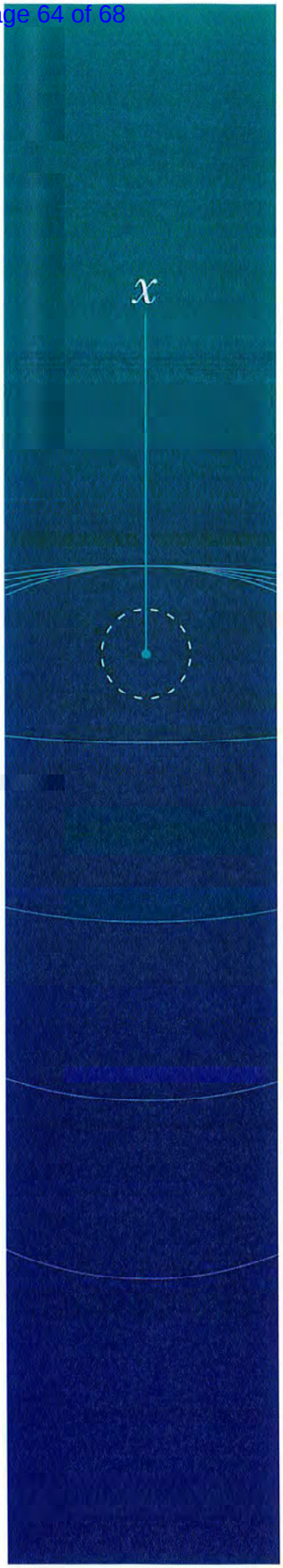
Myers TJ, Radke CJ. The role of residual oil in the mechanistic simulation of foam flow in porous media: Theory and experiment. 68th Annual Western Regional Meeting of the Society of Petroleum Engineers, Bakersfield, CA, 1998.

Myers TJ, Radke CJ. Mechanism of rupture of foam lamellae moving across a wetting discontinuity. AIChE Annual Meeting, Los Angeles, CA, 1997.

Myers, TJ, Kaminsky RA, Radke CJ. Water films, asphaltenes, and wettability alteration. AIChE Annual Meeting, Los Angeles, CA, 1997.

Myers, TJ, Kaminsky RA, Radke CJ. Asphaltene deposition and wettability alteration. Western Regional Meeting of the Society of Petroleum Engineers, Long Beach, CA, 1997.

Radke CJ, Myers TJ, Cohen DG, Patzek TW. Reservoir simulation of foam displacement with a mechanistic trapping function. Department of Energy Petroleum Symposium, Houston, TX, 1997.



Appendix B

Deposition and Trial Testimony of Timothy J. Myers, Ph.D., P.E., CFEI

Four Year Testimony of
Timothy J. Myers, Ph.D., P.E., CFEI

Four Year Testimony of Timothy J. Myers, Ph.D., P.E., CFEI			
Name of Case	**Type**	**Docket**	**Year**
Paddock Enterprises, LLC v. United States of America	Deposition	United States District Court for the Northern District of Ohio Civil Action No. 5:22-cv-1558	2024
In the Matter of the Appeal of: Mannington Mills, Inc., Appellant. Inspection No. 1220329	Trial	State of California Occupational Safety and Health Appeals Board	2024
Patricia A. Deegan, Executrix of the Estates of Patsy P. Nettis and Sally-Marie Nettis v. All-Gas and Equipment Company, Inc., et al.	Deposition	Connecticut Superior Court, Judicial District of Hartford at Hartford HHD-CV-21-6153932-S HHD-CV-21-6153933-S HHD-CV-22-6153934-S HHD-CV-22-6153935-S	2024
Central Mutual Insurance Company v. Eaton Corporation	Deposition	District Court of Carter County State of Oklahoma No. CJ-20-86	2024
IN RE: Eastman Chemical Company Litigation	Deposition	United District Court for the District of South Carolina Orangeburg Division Case Nos. 5:17-CF-01010-SAL, 5:17-CF-01013-SAL, 5:17-CF-01015-SAL,	2024
Ljiljana Petrovic McCune, et al. v. Midwest Can Company, LLC	Deposition	Circuit Court of Cook County, Illinois County Department, Law Division No.: 2021-L-004118	2024
Walker Properties Interests, LLC v. Goodyear Tire and Rubber Company et al.	Trial	19th Judicial District Court Parish of East Baton Rouge State of Louisiana No: 655-780	2023
Mitsui Sumitomo Insurance Company of America v. Hartford Steam Boiler & Inspection Company	Arbitration	Insurance Arbitration	2023
Mitsui Sumitomo Insurance Company of America v. Hartford Steam Boiler & Inspection Company	Deposition	Insurance Arbitration	2022
Walter T. and Gwendolyn R. Mitchell v.	Deposition	Commonwealth of Kentucky Fayette Circuit Court	2022

Four Year Testimony of Timothy J. Myers, Ph.D., P.E., CFEI			
Name of Case	**Type**	**Docket**	**Year**
Rocky Top Log Furniture, LLC, et al.		Division IV Civil Action No. 18-CI-03408	
In Re: January 24th Explosion Litigation	Deposition	In the District Court of Harris County, Texas, 11th Judicial District	2022
Melvin and Vickie Pittman v. The Plastics Group, Inc. et al., and Do It Best Corp.	Deposition	United States District Court for the District of South Carolina (Spartanburg Division) C/A No.: 7:21-cv-00472-HMH	2022
The Netherlands Insurance Company, et al., and Liberty Mutual Fire Insurance Company, et al. v. HP, Inc. and Insight Direct USA, Inc.	Deposition	United States District Court for the District of Massachusetts (Easter Division) Docket No. 1:18-CV-12136	2022
Joseph Kolodej v. Cedar Island Marina	Deposition	State of Connecticut Superior Court Judicial District of New Haven No. NNH-CV17-6074372S	2021
Central Mutual Insurance Company v. Arch Reinsurance Company	Arbitration	Insurance Arbitration	2021
Central Mutual Insurance Company v. Arch Reinsurance Company	Deposition	Insurance Arbitration	2020

Compensation

Exponent, Inc. is compensated at US$630 per hour for the time of Dr. Myers in 2024.

Appendix C

Materials Reviewed

1. Report of Jason Karasinski, dated October 14, 2024
2. Report of Dr. Steve Martin, dated October 14, 2024
3. Report of Andy Litzinger, dated October, 2024
4. Allegany County Fire Investigation Report
5. Deposition of Plaintiff Carol Marcellin
6. Deposition of Lee Atkinson
7. Scene inspection notes and photographs of Greg Gorbett
8. Lab inspection notes and photographs of Don Galler
9. HP Production Documents
10. Plaintiff Production Documents
11. Written discovery responses and other miscellaneous case discovery material
12. National Fire Protection Association Guide for Fire and Explosion Investigations, (NFPA 921), 2024 ed.
13. Dr. Quinn Horn's Expert report.
14. nortekhvacwarranty.com/WarrantyCoverage.aspx?SiteCode=N, accessed on 12/01/2024
15. https://hollandheating.com/wp-content/uploads/2021/05/M7RL-Gas-Furnace-User-Manual.pdf, accessed on 12/01/2024